The Chiggers of Panama
(Acarina : Trombiculidae)

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Ewing (1925) described the first chigger from Panama. Fairchild (1943) prepared the first list in which he recorded eight species and was followed by Wharton and Fuller (1952) who recorded 12 species. Both included *Trombicula cavernarum* Ewing, 1933 and *T. trifurca* Ewing, 1933, known only as adults and therefore not further considered here. Brennan and Jones (1961a) added 17 new species and three new genera.

The present report concerns large numbers of chiggers collected in Panama (most after 1954 and the great majority from 1960 to 1962), from nearly 5000 vertebrate hosts of about 70 mammalian, 50 avian and a few reptilian species. Seventy-six species of chiggers, distributed among 29 genera, are recorded. Five of these genera and 16 species are described as new. Several other undescribed species and new genera have been recognized, but are not included because of inadequate material.

The active support and cooperation of the following individuals and their organizations are acknowledged: Major Vernon J. Tipton and Mr. Charles M. Keenan, Preventive Medicine Division, United States Army Caribbean; Dr. Graham B. Fairchild and Mr. Pedro Galindo, Gorgas Memorial Laboratory; Dr. Nathan Gale, Veterinary Division, Canal Zone Government. They assisted the authors, either directly or indirectly, in obtaining permission to collect in the Canal Zone and the Republic of Panama, by arranging field trips, by providing transportation via land, air, and water, by providing various items of essential supplies and equipment, by generously lending laboratory and field personnel, and by collecting many vertebrate hosts and their parasites.

For specimens collected after May 1960, identifications of Panamanian

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[1, 2] U. S. Department of Health, Education, and Welfare, Public Health Service, National Institutes of Health, National Institute of Allergy and Infectious Diseases, Rocky Mountain Laboratory, Hamilton, Montana, and Middle America Research Unit, Ancon, Canal Zone.

reptiles were by Mr. Hymen Marx, Chicago Natural History Museum; of birds by Dr. Alexander Wetmore, Smithsonian Institution; of mammals by Dr. Charles O. Handley, United States National Museum. We are unable to credit accurately host determinations prior to 1960, although Dr. Handley identified many of the mammals collected since 1957.

Holotypes of all new species are deposited in the Rocky Mountain Laboratory (RML). Paratypes are deposited there and in the United States National Museum, the British Museum (Natural History), and the Chicago Natural History Museum, as indicated.

If not otherwise indicated, collecting of new forms is credited to organizations: Environmental Health Branch, Preventive Medicine Division, United States Army Caribbean (EHB); Middle America Research Unit (MARU).

KEY TO PANAMANIAN GENERA

1. Leg I with six segments; coxa I with two setae; spiracles and tracheae present; scutum with six setae (Leeuwenhoekiinae) 2
   Leg I with seven segments; coxa I with one seta; spiracles and tracheae absent; scutum with three, four, five, or seven setae 3
2. Scutum with anteromedian projection; cheliceral blade with series of teeth ..... *Odontacarus* Ewing
   Scutum without anteromedian projection; cheliceral blade with tricuspid cap only ..... *Sasacarus* Brennan and Jones

3(1). Scutum with a pair of anterosubmedian setae (Apoloniinae) .. *Vargatula* n. gen.
   Scutum with a single anteromedian seta (Trombiculinae) 4
4. Sensillae expanded 5
   Sensillae flagelliform 18
5. With dorsal platelets in addition to scutum .. *Polylopadium* Brennan and Jones
   Without additional dorsal platelets 6
6. PL's and most dorsal setae broad-foliate ..... *Cordiseta* Hoffmann
   PL's and dorsal setae not foliate 7
7. Sensillae with elongate flagelliform setules, parasitic on bats ..... *Perissopalla* Brennan and White
   Sensillae without flagelliform setules 8
8. Cheliceral blades with tricuspid cap only or a single minute subapical dorsal tooth or hook 9
   Cheliceral blades with one or a series of dorsal teeth plus tricuspid cap 16
9. Posterior margin of scutum obsolescent or absent; coxa II with two setae; intranasal habitat ..... *Kymocta* Yunker and Brennan
   Posterior margin of scutum present; coxa II with one seta; habitat not intranasal 10
10. Tarsi with nude subapical setae; sensillae slightly expanded, but with large swollen setules, parasitic on bats ..... *Speleocola* Lipovsky
    Tarsi without nude subapical setae; sensillae greatly expanded; setules not swollen 11
11. Integumental striae encroaching on posterior half of scutum ..... *Neoschoengastia* Ewing
    Scutum without striae 12
12. Leg segmentation 7-7-7; ventral humeral setae absent 13
    Leg segmentation usually 7-6-6, rarely 7-7-6 or 7-7-7 in which cases ventral humeral setae are always present, but may be present or absent if leg segmentation is 7-6-6 14
13. PL's extrascutal ..... *Ascoschoengastia* Ewing
    PL's on scutum ..... *Euschoengastia* Ewing

14(12). Ventral humeral setae and parasubterminala present..... *Pseudoschoengastia* Lipovsky
Ventral humeral setae and parasubterminala absent..... 15

15. PL's on scutum; genualae II and III absent; intradermal habitat..... *Intercutestrix* n. gen.
PL's off scutum; genualae II and III present; habitat not intradermal..... *Vanidicus* Brennan and Jones

16(8). Cheliceral blade with one dorsal tooth in addition to tricuspid cap; genualae II and III present; habitat intranasal..... *Blix* n. gen.
Cheliceral blade with a series of dorsal teeth; genualae II and III absent.... 17

17. Ventral humeral setae present; cheliceral blade sharply curved; palpal tibial claw bifurcate; scutum subquadrate; intranasal habitat... *Myxacarus* n. gen.
Ventral humeral setae absent; cheliceral blade nearly straight; palpal tibial claw trifurcate; scutum much wider than deep; habitat not intranasal.... *Aniatrus* Brennan and Jones

18(4). With seven scutal setae..... *Hoffmannina* Brennan and Jones
With five scutal setae..... 19

19. PL's off scutum..... *Tecomatlana* Hoffmann
PL's on scutum..... 20

20. Palpal tibial claw with a single prong..... 21
Palpal tibial claw with two or three prongs..... 23

21. Eyes large, 2/2, in a plate; anterior scutal setae branched; sensillae branched; a mastitarsala III; habitat not intranasal..... *Crotiscus* Ewing
Eyes absent or only a single reduced pair; anterior scutal setae nude; sensillae nude or with few vestigial barbs; no mastitarsala III; intranasal habitat, on bats 22

22. Scutum cuneiform; eyes absent; all leg segments with one or more elongate nude setae; palpal femur greatly enlarged..... *Alexfainia* Yunker and Jones
Scutum subquadrate; eyes 1/1; leg segments without nude setae; palpal femur not enlarged ..... *Vergrandia* Yunker and Jones

23(20). With a mastifemorala I; basifemora and telofemora semi-fused to fused; intranasal, on bats..... *Perates* Brennan and Dalmat
Without a mastifemorala I; basifemora and telofemora not fused, but distinctly articulated 24

24. Cheliceral blade with hood-like serrate distal expansion; posterior margin of scutum with a sharp median tip; on bats..... *Beamerella* Brennan
Cheliceral blade otherwise, usually with a subapical dorsal tooth or a tricuspid cap; posterior margin of scutum without a tip, although it may be angulate. 25

25. Scutum cuneiform with a medially cleft posterior margin; all scutal setae nude; coxae II and III multisetose; intranasal habitat; on rodents..... *Crotonasis* n. gen.
Scutum not cuneiform and without a cleft posterior margin; all scutal setae branched; coxae II and III unisetose; habitat not intranasal..... 26

26. Palpal claw bifurcate, accessory prong inner and ventral.. *Eutrombicula* Ewing
Palpal claw normally trifurcate, but if bifurcate, accessory prong outer and dorsal 27

27. Mastitarsala III present; three genualae I; scutum deep, frequently pentagonal, the AL's never in anterolateral angles and usually set considerably behind margin; sensillae branched; palpal femoral seta branched; on birds ..... *Blankaartia* Oudemans
Without the above combination of characters..... 28

28. Mastitarsala III absent; two genualae I; scutum roughly rectangular, the AL's always in anterolateral angles; sensillae branched; palpal femoral, genual, and tibial setae nude; galeal seta branched..... *Leptotrombidium* Nagayo et al.
Without the above combination of characters..... *Trombicula* Berlese

Genus **Odontacarus** Ewing

Odontacarus Ewing, 1929, Man. Ext. Parasites, p. 188.
Type-species: *Trombicula dentata* Ewing, 1925.

KEY TO PANAMANIAN SPECIES

Tarsus III with a tarsala.....*chiapanensis* (Hoffmann)
Tarsus III without a tarsala.....*fieldi* Brennan and Jones

Odontacarus chiapanensis (Hoffmann)

Acomatacarus chiapanensis Hoffmann, 1948, Rev. Inst. Salub. Enferm. Trop., 9, (3), pp. 179–182, figs. 6–11.

Twenty-nine specimens off (5) *Proechimys semispinosus,* Almirante (Bocas del Toro), 22 to 27 January and 16 July 1960. First Panamanian records.

Odontacarus fieldi Brennan and Jones

Odontacarus fieldi Brennan and Jones, 1961, Jour. Parasit., 47, (1), pp. 105–106, fig. 1.

Seventy specimens identified from 28 lots. Hosts: BIRDS, *Neomorphus geoffroyi salvini, Odontophorus erythrops;* MAMMALS, *Didelphis marsupialis, Proechimys semispinosus, Liomys adspersus, Sciurus granatensis, Sigmodon hispidus, Zygodontomys microtinus, Felis pardalis.* Localities: Cacao Plantation, Summit, and Miraflores (Canal Zone) ; Cerro Pirre (Darién) ; Cerro Campana (Panamá) ; Isla Bastimentos (Bocas del Toro) ; Cerro Hoya (Los Santos). Active throughout the year. See Brennan and Jones (1961a) for other Panamanian records.

Genus **Sasacarus** Brennan and Jones

Sasacarus Brennan and Jones, 1959, Ann. Ent. Soc. Amer., 52, (1), p. 8.
Type-species: *Chatia furmani* Hoffmann, 1954.

Sasacarus furmani (Hoffmann)

Chatia furmani Hoffmann, 1954, Ann. Esc. Nac. Cienc. Biol. Mex., 8, (1–2), pp. 17–20, figs. 1–4.

Sixty-eight specimens identified from 30 lots. Hosts: *Didelphis marsupialis, Proechimys semispinosus, Heteromys desmarestianus.* Localities: Piña, Gamboa Road, Fort Gulick, and France Field, (Canal Zone) ; Cerro Azul (Panamá) ; Bocas del Toro Province. First records for Panama.

Sporadic collections, 1954 to 1962, November to April, suggest peak activity during the dry season. The Panamanian form differs from the typical form in that tarsala II is noticeably thicker and not longer than tarsala I.

Vargatula, new genus

Type-species: *Vargatula hispida,* new species.

DIAGNOSIS: Apoloniine larvae with anterolateral, paired submedian, and displaced posterolateral scutal setae; sensillae flagelliform, branched. Cheliceral blades with minute dorsal tooth. Palpal tarsus with five branched

setae, a subterminala, and a tarsala; tibial claw trifurcate. Eyes absent. No genuala II and no specialized setae on leg III.

Differs from the other three genera of the subfamily Apoloniinae (Wharton and Fuller, 1952) in lacking an anteromedian scutal projection.

Vargatula hispida, new species. Figure 12.

DIAGNOSIS: Scutum cuneiform, apex posterior, sensillae branched. One genuala I, no genualae II and III, no tibiala III, no parasubterminala. Coxal setae 1-2-1. Palpal setae branched. Dorsal, sternal, and ventral setae numerous.

DESCRIPTION: *Idiosoma.*—Ellipsoidal. Length and width of holotype, nearly engorged, 515 by 290 μ. Eyes absent. Anus at about the eighth row of ventral setae. *Scutum.*—As figured, cuneiform, moderately punctate, two pairs of pores at lateral margins in posterior half of scutum. Setae with long coarse branches. Sensillae branched to base. Measure-

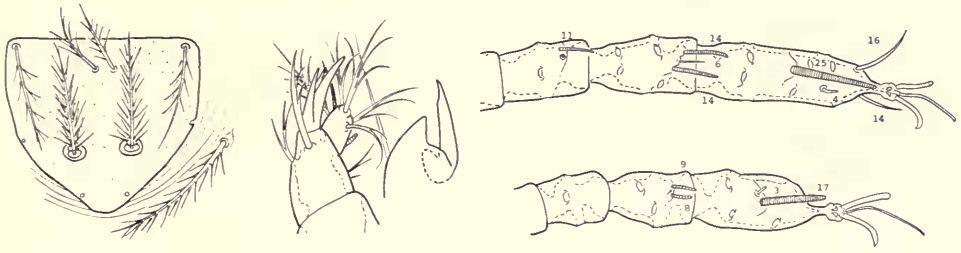

FIG. 12. *Vargatula hispida,* new species. Scutum. Palpal tarsus and tibia. Cheliceral blade. Specialized setae of legs I and II, with measurements in microns.

ments of holotype: AW 41, SB 13, ASB 29, PSB 15, AM 12, AL 17, PL 32, S 24 μ. *Gnathosoma.*—Punctate. Capitular sternum transversely rugose. Cheliceral blade nearly straight, with minute dorsal tooth. Galeal seta nude. Palpal setae B/B/BBB; claw trifurcate; tarsus with five branched setae, a subterminala, and a tarsala. *Legs.*—Punctate. Specialized setae as figured. No pretarsala II. Non-specialized setae coarsely branched. Coxa I with one, II with two, and III with one branched setae. Empodia elongate, nearly filiform. *Body setae.*—Dorsal setae thickened and becoming thicker and longer posteriorly, heavily branched, 17 to 40 μ, four or five humerals on each side plus about 110 dorsals. Ventral setae, 12 to 16 sternals arranged 2-2 plus a fairly uniform group at the level of coxae III, and about 150 ventrals. Postanals similar to dorsals.

TYPE MATERIAL: Holotype and 10 paratypes, RML no. 44425, off *Dasypus novemcinctus,* Paraíso (Canal Zone), 12 February 1962; 4 paratypes, same host and locality, 27 February and 26 March 1962, MARU. Holotype in the collection of the Rocky Mountain Laboratory. Paratypes in the Rocky Mountain Laboratory, United States National Museum, Chicago Natural History Museum, British Museum (Natural History).

Genus **Alexfainia** Yunker and Jones

Alexfainia Yunker and Jones, 1961, Jour. Parasit., 47, (6), p. 995.

Type-species: *Alexfainia chilonycteris* Yunker and Jones, 1961.

KEY TO PANAMANIAN SPECIES

Palpal femur with hamuli.....*chilonycteris* Yunker and Jones
Palpal femur without hamuli.....*munozi* n. sp.

Alexfainia chilonycteris Yunker and Jones

Alexfainia chilonycteris Yunker and Jones, loc. cit., pp. 995–996, pl. I.

More than 100 specimens (22 lots) from intranasal passages of (21) *Pteronotus parnellii,* Paraíso (Canal Zone), 18 August 1960, 4 January and

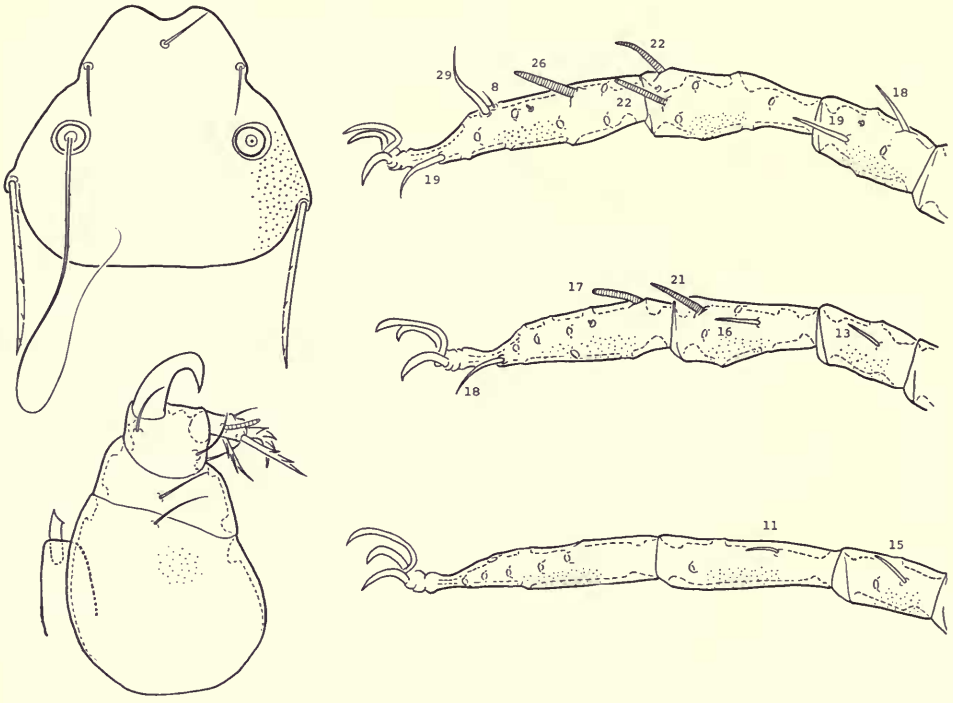

FIG. 13. *Alexfainia munozi,* new species. Scutum. Cheliceral blade and palp. Specialized setae of legs.

2 March 1962, Madden Field (Canal Zone), 7 July and 3 October 1961; 1 off *Carollia perspicillata,* Pacora (Panamá), 31 October 1960. See Yunker and Jones (1961) for other Panamanian records.

Alexfainia munozi, new species. Figure 13.

DIAGNOSIS: A large intranasal chigger, separated from *A. chilonycteris* Yunker and Jones by palpal femur lacking hamuli and scutum with more emarginate and narrow anterior margin.

DESCRIPTION: *Idiosoma.*—Ellipsoidal, mildly constricted when engorged. Length and width of holotype, unengorged, 310 by 165 μ, of an engorged paratype, 1463 by 793 μ. Eyes absent. Anus at third row of ventral setae. *Scutum.*—As figured, densely punctate, cuneiform with a pronounced emarginate and narrow anterior margin. Anterior

setae short, nude, the holotype anomalous in that the AM is absent; posterior setae much longer, with tiny barbs. Sensillae slender, elongate, with few minute barbs. Measurements of holotype: AW 44, PW 86, SB 54, ASB 39, PSB 38, AP 42, AM–, AL 8, PL 53, S 96 μ. *Gnathosoma.*—Densely punctate. As in *A. chilonycteris,* a marked disparity in size between the greatly reduced chelicerae and the exceedingly enlarged palpi, as figured. Palpal setae N/N/NNN; claw large, simple, recurved; tarsus with three heavily barbed thick setae, four small nude setae, and a tarsala. Galeal seta nude. *Legs.*—Punctate. Specialized setae as figured. Non-specialized setae sparsely branched, some with few barbs, others apparently nude, a thick seta ventrally on telofemur and genu of leg III, much longer than homologous setae in *chilonycteris.* Coxal setae II much shorter than I and III. *Body setae.*—Dorsal setae with tightly appressed barbs, some appearing nude, 47 to 54 μ, arranged 2-6-6-8-6-6-4-2. Ventral setae, 2-2 sternals plus 34; sternals apparently nude, others minutely barbed.

TYPE MATERIAL: Holotype, RML no. 44413, off *Pteronotus psilotis,* Penonomé (Coclé), 8 February 1962; 8 paratypes, same host and locality, 30 January and 8 February 1962, V. J. Tipton, collector. Holotype in the collection of the Rocky Mountain Laboratory. Paratypes in the Rocky Mountain Laboratory, United States National Museum, Chicago Natural History Museum, and the British Museum (Natural History).

Named for Mr. Angel Muñoz, Acarology Group, Middle America Research Unit.

Genus **Aniatrus** Brennan and Jones

Aniatrus Brennan and Jones, 1961, Jour. Parasit., 47, (1), p. 105.

Type-species: *Aniatrus bifax* Brennan and Jones, 1961.

Aniatrus bifax Brennan and Jones

Aniatrus bifax Brennan and Jones, loc. cit., pp. 106–107, fig. 2.

Five specimens off (2) *Dasypus novemcinctus* near Pedro Miguel River and Paraíso, El Rallo (Canal Zone), 15 and 27 February 1962. *A. bifax* was described from a single specimen off *Dasypus novemcinctus,* Albrook Air Force Base (Canal Zone), 17 March 1959.

Genus **Ascoschoengastia** Ewing

Ascoschoengastia Ewing, 1946, Proc. Biol. Soc. Wash., 59: 71.

Type-species: *Neoschoengastia malayensis* Gater, 1932.

Ascoschoengastia dyscrita Brennan and Jones

Ascoschoengastia dyscrita Brennan and Jones, 1961, Jour. Parasit., 47, (1), pp. 107–108, fig. 3.

Twenty-eight specimens identified from 12 lots. Hosts: *Didelphis marsupialis, Heteromys desmarestianus, Hoplomys gymnurus, Liomys adspersus, Oryzomys capito, Tylomys watsoni.*

Localities: Piña, Cacao Plantation, Miraflores, Summit, and Corte Culebra Road (Canal Zone); Cerro Azul (Panamá). From 1959 to 1962, collections were made from September to March with none from April to August. Brennan and Jones (1961a) record the following additional hosts: *Oryzomys caliginosus, Sigmodon hispidus,* and *Proechimys semispinosus,* the last from Bocas del Toro Province.

Genus **Beamerella** Brennan

Beamerella Brennan, 1958, Jour. Kans. Ent. Soc., 31, (2), p. 71.
Type-species: *Beamerella acutascuta* Brennan, 1958.

Beamerella acutascuta Brennan

Beamerella acutascuta Brennan, loc. cit., pp. 72–73, fig. 1.

Six specimens off *Micronycteris megalotis*, Pacora (Panamá), 31 October 1960; 3 off *Saccopteryx bilineata*, Pacora, 31 October 1960; 7 off *Carollia perspicillata*, Los Santos Province, 27 January 1962. First Panamanian records.

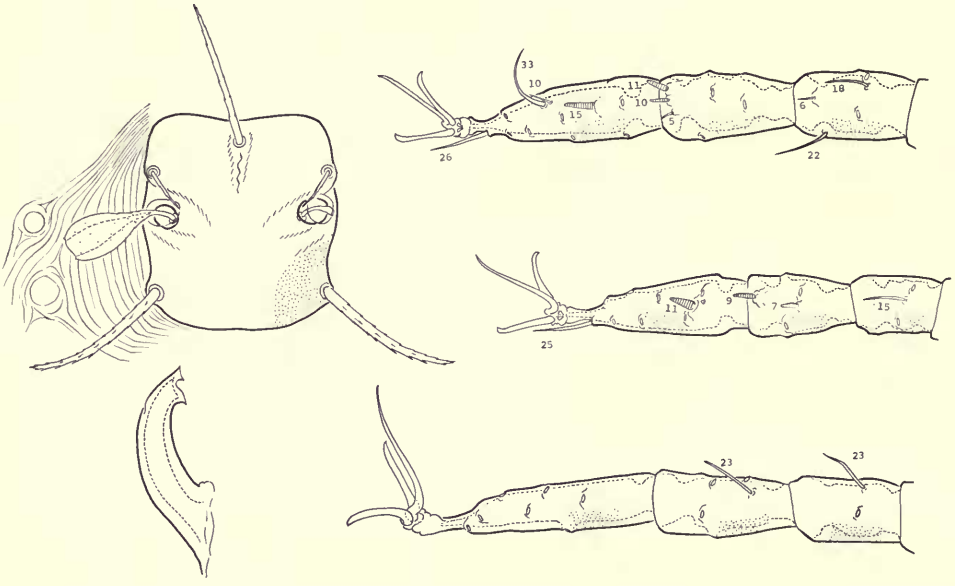

FIG. 14. *Blix cabassoi*, new species. Scutum and eyes. Cheliceral blade. Specialized setae of legs.

Blix, new genus

Type-species: *Blix cabassoi*, new species.

DIAGNOSIS: Intranasal trombiculine larvae with leg segmentation 7-7-7. Legs without mastisetae, but with genualae II and III and a tibiala III. Scutum subquadrate, with five setae and expanded sensillae. Eyes present. Cheliceral blades with tricuspid cap and a prominent dorsal tooth. Palpal tarsus with five branched setae, a subterminala, and a tarsala; tibial claw trifurcate.

This genus has affinities with *Schoutedenichia* from which it differs in the palpal tarsal setation, a tibiala III, unique form of scutum, etc.

Blix cabassoi, new species. Figure 14.

DIAGNOSIS: Fairly large intranasal species. Rectangular scutum deeper than wide, sensillae arising just within lateral margins. Cheliceral blades with large dorsal tooth in addition to tricuspid cap. Two genualae I and a tibiala III. Gnathosoma, scutum, and legs densely and conspicuously punctate.

DESCRIPTION: *Idiosoma.*—Ellipsoidal, slightly constricted. Length and width of holotype, slightly engorged, 885 by 390 μ. Eyes 2/2, no plate. Anus at sixth row of ventral setae. *Scutum.*—Approximately rectangular, with mildly convex posterior margin and lateral margins bulging opposite sensillary bases which they nearly touch. Puncta conspicuous and compact. AL's reduced, with barbs suggested; AM and PL's with appressed barbs. Sensillae oblanceolate, apparently lacking setules. Measurements of holotype: AW 88, PW 76, SB 70, ASB 51, PSB 47, AP 60, AM 74, AL 18, PL 75, S 57 μ. *Gnathosoma.*—Densely punctate. Chelicerae elongate, blades with tricuspid cap and prominent dorsal tooth. Palpi densely punctate, all setae barbed; tarsus with five branched setae, a subterminala, and short tarsala; claw trifurcate, one accessory prong smaller than the other. Galeal seta nude. *Legs.*—Densely punctate. Specialized setae as figured. Non-specialized setae long, with few appressed barbs. *Body setae.*—Dorsal setae barbed, 48 to 62 μ, arranged 2-6-8-8-4-2-2. Ventral setae, 2-2 sternals plus about 70.

TYPE MATERIAL: Holotype and 16 paratypes, RML no. 40076, from nasal mucosa of *Cabassous centralis,* Gamboa (Canal Zone), 29 November 1960, Dr. Nathan Gale, collector. Holotype in the collection of the Rocky Mountain Laboratory. Paratypes in the Rocky Mountain Laboratory, United States National Museum, Chicago Natural History Museum, and the British Museum (Natural History).

Genus **Cordiseta** Hoffmann

Cordiseta Hoffmann, 1954, An. Esc. Nac. Cienc. Biol. Mex., 8: 26.

Type-species: *Walchiella* (*Cordiseta*) *mexicana* Hoffmann, 1954.

Cordiseta mexicana (Hoffmann)

Walchiella (*Cordiseta*) *mexicana* Hoffmann, loc. cit., pp. 27–30, figs. 15–20.

One specimen off *Scotinomys teguina,* Cerro Punta (Chiriquí), 4 May 1960; one off *Peromyscus nudipes,* same locality, 18 January 1961. First records for Panama.

Genus **Crotiscus** Ewing

Crotiscus Ewing, 1944, Proc. Biol. Soc. Wash., 57: 102.

Type-species: *Trombicula desdentata* Boshell and Kerr, 1942.

Crotiscus desdentatus (Boshell and Kerr)

Trombicula desdentata Boshell and Kerr, 1942, Rev. Acad. Colomb. Cienc. Exacta, Fisico-Quim. y Nat., 5, (17), pp. 11–12 (in reprint), figs. 15–17.

About 230 specimens identified from 35 lots. Hosts: *Didelphis marsupialis, Philander opossum, Proechimys semispinosus, Hoplomys gymnurus, Heteromys desmarestianus, Nectomys alfari, Sigmodon hispidus.* Localities: Piña, Road K-9, and Fort Gulick (Canal Zone); Almirante, Cayo Agua, and Isla Bastimentos (Bocas del Toro); Cerro Campana (Panamá). Taken throughout the year, from 1954 to 1962. First Panamanian records.

This polymorphic species is widely distributed in the American tropics. A form common to Panama is *C. desdentatus tissoti* Fauran (1960), described as a variety. Another similar form known from Cerro Campana has a much longer and strongly curved tarsala I.

Crotonasis, new genus

Type-species: *Crotonasis fissa,* new species.

DIAGNOSIS: Intranasal trombiculine larvae with leg segmentation 7-7-7; coxae II and III multisetose. Scutum cuneiform, with five nude setae and short, nude, flagelliform sensillae. Eyes absent. Cheliceral blades short, recurved, with a single dorsal hook. Palpal tarsus with four branched setae and a tarsala; tibial claw trifurcate.

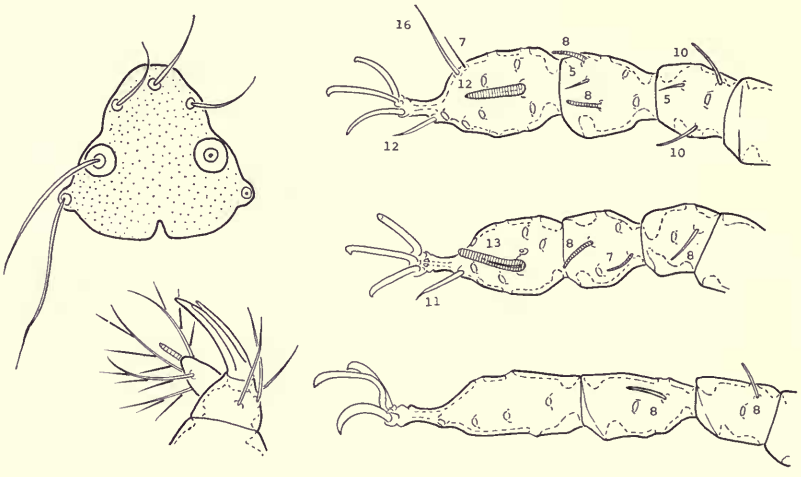

FIG. 15. *Crotonasis fissa,* new species. Scutum. Palpal tarsus and tibia. Specialized setae of legs.

Distinguished from other American genera of intranasal chiggers with flagelliform sensillae, by the multisetose coxae II and III, trifurcate palpal tibial claw, and all scutal setae nude.

Crotonasis fissa, new species. Figure 15.

DIAGNOSIS: Two genualae I, genualae II and III, tibiala III. Coxae II and III multisetose. Three pairs of sternal setae. Palpal, genual, and tibial setae nude. Posterior margin of scutum with a median cleft.

DESCRIPTION: *Idiosoma.*—Broad-ovate. Length and width of holotype, engorged, 405 by 278 μ. Eyes absent. Anus at third row of ventral setae. *Scutum.*—As figured, cuneiform, with numerous fine puncta. All setae nude. Sensillary bases nearly touching lateral margins. Sensillae short, flagelliform, nude. Measurements of holotype: AW 14, PW 39, SB 20, ASB 21, PSB 17, AP 25, AM 15, AL 15, PL 27, S 24 μ. *Gnathosoma.*—Finely punctate. Blades small, recurved, with a subapical dorsal hook. Galeal seta nude. Palpal setae B/N/NNN; tarsus with four branched setae and a tarsala; claw trifurcate. *Legs.*—Finely punctate. Specialized setae as figured, tarsala II thicker than tarsala I. Non-

specialized setae sparsely branched. Coxa I with one, II with two, and III with seven to nine branched setae. *Body setae.*—Dorsal setae bare, or with barbs merely suggested, 22 to 30 μ, arranged 2-6-6-4-2. Ventral setae, 2-2-2 sternals plus 32. Sternals and preanals barbed, postanals similar to dorsals.

TYPE MATERIAL: Holotype and 7 paratypes, RML no. 43471, from nasal mucosa of *Liomys adspersus,* Summit (Canal Zone), 28 August 1961; 3 paratypes, same host and locality, 27 and 28 December 1961, MARU. Holotype in the collection of the Rocky Mountain Laboratory. Paratypes in the Rocky Mountain Laboratory, United States National Museum, Chicago Natural History Museum, and the British Museum (Natural History).

Genus **Doloisia** Oudemans

Doloisia Oudemans, 1910, Ent. Ber., 3: 87.

Type-species: *Doloisia synoti* Oudemans, 1910.

Subgenus **Kymocta** Yunker and Brennan

Kymocta Yunker and Brennan, 1962, Acarologia, 4, (4), p. 572.

Type-species: *Kymocta teratarsalis* Yunker and Brennan, 1962.

KEY TO PANAMANIAN SPECIES

Genuala III present.....*teratarsalis* Yunker and Brennan
Genuala III absent.....*chironectes* Yunker and Brennan

Doloisia (Kymocta) chironectes Yunker and Brennan

Doloisia (*Kymocta*) *chironectes* Yunker and Brennan, 1962, Acarologia, 4, (4), pp. 574–576, fig. 3.

No records other than of the original description: 2 specimens off *Chironectes minimus,* Pedro Miguel (Canal Zone), 19 February 1962.

Doloisia (Kymocta) teratarsalis Yunker and Brennan

Doloisia (*Kymocta*) *teratarsalis* Yunker and Brennan, loc. cit., p. 574, fig. 2.

Described from 6 specimens off *Heteromys desmarestianus,* Piña (Canal Zone), 7 to 15 December 1960; 1 off *Hoplomys gymnurus,* Piña, 6 December 1960; 7 off *Tylomys watsoni,* Piña, 8 August 1961. No further records.

Genus **Euschoengastia** Ewing

Euschoengastia Ewing, 1938, Jour. Wash. Acad. Sci., 28: 293.

Type-species: *Euschoengastia americana* Ewing, 1938 (=*Schoengastia sciuricola* Ewing, 1925).

KEY TO PANAMANIAN SPECIES

1. With a mastitarsala III.....2
   Without a mastitarsala III.....3
2. Palpal genual and ventrotibial setae branched; scutum deep, with narrow lanceolate sensillae .....*tragulata* Brennan and Jones
   Palpal genual and ventrotibial setae nude; scutum shallow, with broad obovate sensillae .....*nunezi* (Hoffmann)
3(1). Palpal tibial claw with five prongs; tibiala III absent; coxa III with three setae .....*libertatis* Brennan and Dalmat

Palpal tibial claw with three prongs; tibiala III present; coxa III usually unisetose, rarely multisetose 4

4. With two genualae I 5
   With three genualae I 7

5. Coxa III with two to four setae; ventral setae extend into area of sternals ..... *cunctata* Brennan and Jones
   Coxa III with one seta; ventral setae not extending to sternals 6

6. Galeal seta branched; palpal dorso- and laterotibial setae branched; dorsal formula begins 2-10; on rodents ..... *enhebra* n. sp.
   Galeal seta nude; palpal dorso- and laterotibial setae nude; dorsal formula begins 2-6; on bats ..... *desmodus* Brennan and Dalmat

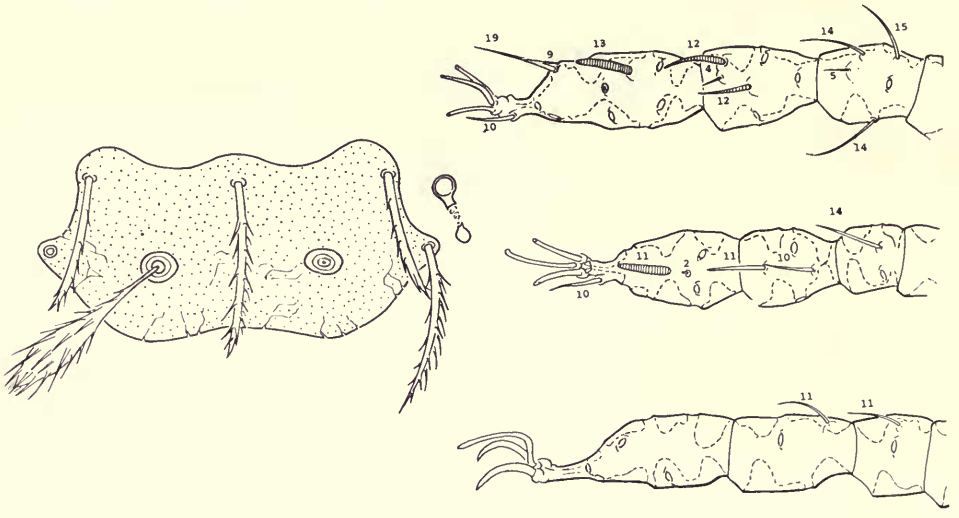

FIG. 16. *Euschoengastia belgicae,* new species. Scutum and eyes. Specialized setae of legs.

7(4). A single pair of eyes; palpal tarsala unusually long (25 μ); on bats ..... *megastyrax* Brennan and Jones
   Two pairs of eyes; palpal tarsala normal 8

8. Scutum subquadrate; sensillae broad, oblanceolate; palpal genual seta branched; on bats ..... *colombiae* (Boshell and Kerr)
   Scutum much wider than deep; sensillae fusiform; palpal genual seta nude; on rodents 9

9. Eyes large; dorsal setae 32, more than 55 μ long; setules of sensillae long and densely distributed ..... *spissa* Brennan and Jones
   Eyes reduced; dorsal setae 24, less than 50 μ long; setules of sensillae long, but moderately distributed ..... *belgicae* n. sp.

Euschoengastia belgicae, new species. Figure 16.

DIAGNOSIS: Distinguished from *E. lipoglena* Brennan and Jones (off bat, Trinidad) by presence of eyes; palpal genual and tibial setae nude; sensillary bases at level of PL's; and about half as many dorsal setae; from *E. spissa* Brennan and Jones by greatly reduced eyes, dorsal formula, and the much smaller size of all setae.

DESCRIPTION: *Idiosoma.*—Broad-ovate. Dimensions of fully engorged specimen cannot be accurately determined because of crushed mount; approximate length and width, 475 by 390 μ. Eyes 2/2, small, in obscure plate. Anus at fourth row of ventral setae. *Scutum.*—As figured, densely punctate, with sinuous margins. Sensillae fusiform, with elongate setules. Measurements: AW 66, PW 78, SB 33, ASB 24, PSB 17, AP 18, AM 34, AL 28, PL 48, S 41 μ. *Gnathosoma.*—Moderately punctate. Blades with tricuspid cap. Galeal seta nude. Palpal setae B/N/NNN; tarsus with at least five branched setae and a tarsala; tibial claw trifurcate. *Legs.*—Punctate. Specialized setae as figured. Nonspecialized setae moderately branched. *Idiosomal setae.*—Dorsal setae with semi-appressed branches, 38 to 42 μ, arranged 2-6-6-4-4-2. Ventral setae, 2-2 sternals plus 18.

TYPE MATERIAL: Holotype, RML no. 40556, off *Heteromys desmarestianus,* Cerro Azul (Panamá), 17 March 1961, MARU. In the collection of the Rocky Mountain Laboratory.

Named for Miss Belgica Rodriguez, Acarology Group, Middle America Research Unit.

Euschoengastia colombiae (Boshell and Kerr)

Neoschoengastia colombiae Boshell and Kerr, 1942, Rev. Acad. Colomb. Cienc. Exacta, Fisico-Quim. y Nat., 5, (17), pp. 16–18 (in reprint), figs. 6–8.

One specimen off *Carollia subrufa,* Cerro Pirre (Darién), 31 January 1961; 1 off same host, Río Changena (Bocas del Toro), 24 September 1961. First records for Panama.

Euschoengastia cunctata Brennan and Jones

Euschoengastia cunctata Brennan and Jones, 1961, Jour. Parasit., 47, (1), pp. 108–109, fig. 4.

Known only from the type series, 8 specimens off *Oryzomys capito* (= *talamancae*), Cerro Azul (Panamá), 8 to 14 February 1956.

Euschoengastia desmodus Brennan and Dalmat

Euschoengastia desmodus Brennan and Dalmat, 1960, Ann. Ent. Soc. Amer., 53, (2), pp. 188–189, fig. 7.

One specimen off *Saccopteryx bilineata,* Chepo (Panamá), 8 October 1959; 4 off bat, El Valle (Coclé), 30 May 1961; 4 off *Glossophaga soricina,* Río Changena (Bocas del Toro), 19 September 1961; 3 off *Carollia subrufa,* Río Changena, 26 September 1961; 2 off *Carollia castanea,* Cerro Hoya (Los Santos), 9 February 1962; 2 off *Micronycteris megalotis,* Fort Kobbe (Canal Zone), 2 February 1962. First Panamanian records.

Euschoengastia enhebra, new species. Figure 17.

DIAGNOSIS: Two genualae I, no genualae II and III, tibiala III. Distinguished from *E. utahensis* Brennan and Beck by the widely separated sensillae, longer scutal setae, more body setae, branched galeal seta, and longer tarsala I than tarsala II.

DESCRIPTION: *Idiosoma.*—Broad-ovate. Length and width engorged, 463 by 288 μ. Eyes large, 2/2, in a plate. Anus at about fourth row of ventral setae. *Scutum.*—As figured, trapezoidal with mildly sinuous margins, punctate. Sensillae obovate, anterior surface densely setulose, posterior surface with a denuded median area, stems barbed nearly to base. Setae with semi-appressed branches. Measurements: AW 64, PW 95, SB 51, ASB 31, PSB 24, AP 42, AM 38, AL 34, PL 45, S 37 μ. *Gnathosoma.*—Densely punctate.

Cheliceral bases broad, blades with tricuspid cap. Galeal setae branched. Palpal setae B/B/BBB; tarsus with five branched setae, a subterminala and a tarsala; tibial claw trifurcate. *Legs.*—Punctate. Specialized setae as figured. Non-specialized setae sparsely to moderately branched. *Body setae.*—Dorsal setae similar to scutals, 32 to 46 μ, arranged 2-10-2-6-6-6-6-2-2. Ventral setae, 2-2 sternals plus about 50, postanals similar to dorsals.

TYPE MATERIAL: Holotype, RML no. 44401, off *Tylomys watsoni*, Piña (Canal Zone), 7 February 1962, EHB. In the collection of the Rocky Mountain Laboratory.

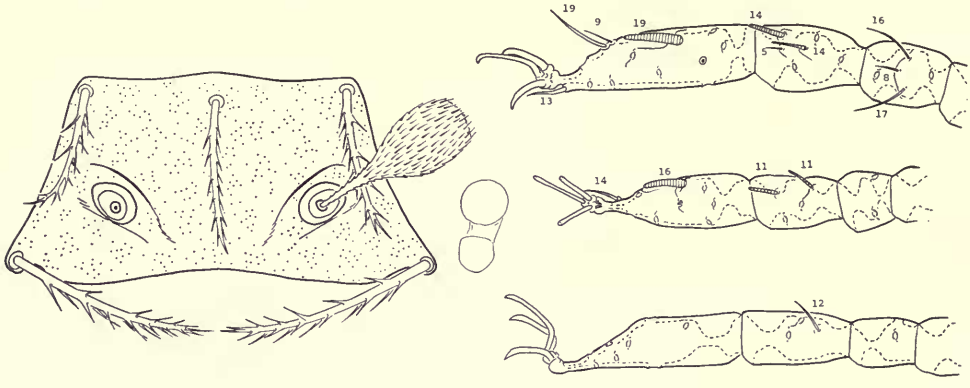

FIG. 17. *Euschoengastia enhebra*, new species. Scutum and eyes. Specialized setae of legs.

Euschoengastia libertatis Brennan and Dalmat

Euschoengastia libertatis Brennan and Dalmat, 1960, Ann. Ent. Soc. Amer., 53, (2), pp. 189–190, fig. 8.

Four specimens off *Peromyscus nudipes*, Highlands of Chiriquí, 12 February 1960. First Panamanian record.

Euschoengastia megastyrax Brennan and Jones

Euschoengastia megastyrax Brennan and Jones, 1960, Acarologia, 2, (4), pp. 506–507, fig. 7.

Seven specimens off unidentified bat, Los Santos, 26 January 1962; 1 off *Carollia perspicillata*, Cacao Plantation (Canal Zone), 12 December 1961; 1 off *Didelphis marsupialis*, Piña (Canal Zone), 18 December 1959. First records for Panama.

Euschoengastia nunezi (Hoffmann)

Neoschoengastia nunezi Hoffmann, 1944, Rev. Inst. Salub. Enferm. Trop., 9, (3), pp. 221–225, figs. 1–4.

One specimen off *Didelphis marsupialis*, Madden Forest (Canal Zone), 24 February 1955; 15 off *Philander opossum*, Canal Zone, 16 and 17 March 1955. First records for Panama.

Euschoengastia spissa Brennan and Jones

Euschoengastia spissa Brennan and Jones, 1961, Jour. Parasit., 47, (1), pp. 109–110, fig. 5.

Known only from the holotype, off *Peromyscus nudipes,* Highlands of Chiriquí, 4 May 1960.

Euschoengastia tragulata Brennan and Jones

Euschoengastia tragulata Brennan and Jones, 1961, Jour. Parasit., 47, (1), pp. 110–111, fig. 6.

One specimen off *Didelphis marsupialis,* Piña (Canal Zone), 16 February 1962; 33 off (5) *Coendou rothschildi,* vicinity of Pedro Miguel River (Canal Zone), 21 February to March 1962. Described from 5 specimens off *Nasua nasua,* Barro Colorado Island (Canal Zone), November 1956.

Genus **Eutrombicula** Ewing

Eutrombicula Ewing, 1938, Jour. Wash. Acad. Sci., 28: 293.

Type-species: *Microthrombidium alfreddugesi* Oudemans, 1910.

KEY TO PANAMANIAN SPECIES

1. With three mastitarsalae III and two mastitibialae III; dorsal formula begins 2-8 ..... *batatas* (Linnaeus)
   With one mastitarsala III and no mastitibialae III; dorsal formula begins 2-6.....2
2. Accessory prong of palpal claw arises at distal three-fourths of axial prong..... ..... *alfreddugesi* (Oudemans)
   Accessory prong of palpal claw arises at distal one-half of axial prong..... ..... *goeldii* (Oudemans)

Eutrombicula alfreddugesi (Oudemans)

Microthrombidium alfreddugesi Oudemans, 1910, Ent. Ber., 3: 84.

Some 1000 specimens identified from 245 lots. Hosts: REPTILES, *Oxybelis* sp., *Pseustes poecilonotus, Spilotes pullatus, Ameiva bifrontata, A. undulata, Anolis* sp., *Sceloporus* sp., unidentified lizards; BIRDS, *Odontophorus erythrops, Taraba major;* MAMMALS, *Didelphis marsupialis, Marmosa robinsoni, Philander opossum, Aotus trivirgatus, Saguinus geoffroyi, Proechimys semispinosus, Heteromys desmarestianus, Coendou rothschildi, Agouti paca, Hydrochaeris hydrochaeris, Sciurus granatensis, Sigmodon hispidus, Zygodontomys microtinus, Reithrodontomys mexicanus, Oryzomys alfaroi, O. capito, Oryzomys* sp., *Peromyscus flavidus, P. nudipes, Scotinomys teguina, S. xerampelinus,* mouse, *Sylvilagus brasiliensis, Nasua nasua, Tayassu tajacu.*

Localities: Galeta Point, Fort Gulick, France Field, Piña, Cacao Plantation, Summit, Madden Forest, Juan Mina, Pedro Miguel, Fort Clayton, Miraflores, Curundu, Roads K-9 and K-10, Corte Culebra Road, and Nuevo Emperador (Canal Zone); Cerro Azul, Cerro Campana, and Pacora (Panamá); Parita (Herrera); Cerro Pirre (Darién); Achiote (Colón); Almirante and Río Changena (Bocas del Toro); Cerro Hoya (Los Santos); Boquete Trail, El Hato, Bambito, and Cerro Punta (Chiriquí). This common pest chigger is more or less active throughout the year, with peak

activity during the wet season, especially in the lowlands, according to collections from 1954 to 1962.

Both the *"lipovskyana"* and *"tropica"* forms are included in the above records. The former, from the Highlands of Chiriquí, is distinguished by a longer than usual tarsala I, and the latter, principally from lowlands, is distinguished by nude genual and ventrotibial palpal setae.

Eutrombicula batatas (Linnaeus)

Acarus batatas Linnaeus, 1758, Syst. Nat. (10th ed.), p. 617.

About 225 specimens identified from 95 lots. Hosts: BIRDS, *Gallus gallus, Hypomorphnus urubitinga, Caracara plancus, Catharus mexicanus, Crotophaga ani, Nyctidromus albicollis, Myiozetetes* sp.; MAMMALS, *Homo sapiens, Hydrochaeris hydrochaeris, Sigmodon hispidus, Zygodontomys microtinus, Reithrodontomys* sp., *Mazama americana.*

Localities: Fort Gulick, France Field, Fort Davis, Gatun, Nuevo Emperador, Fort Clayton, Fort Kobbe, and Curundu (Canal Zone); Tocumen and Pacora (Panamá); Achiote (Colón); Almirante and Río Changena (Bocas del Toro); El Hato (Chiriquí). Active during the wet season; no records available for January, February, or March.

Eutrombicula goeldii (Oudemans)

Microthrombidium goeldii Oudemans, 1910, Ent. Ber., 3: 84.

Some 1000 specimens identified from 280 lots. Hosts: REPTILES, *Pseustes poecilonotus, Ameiva bifrontata, A. festiva, A. undulata;* BIRDS, *Momotus momota, Neomorphus geoffroyi salvini, Malacoptila panamensis, Cyphorhinus aradus phaeocephalus;* MAMMALS, *Didelphis marsupialis, Marmosa mexicana, M. robinsoni, Metachirus nudicaudatus, Philander opossum,* unidentified bats, *Aotus trivirgatus, Saguinus geoffroyi, Dasypus novemcinctus, Proechimys semispinosus, Hoplomys gymnurus, Coendou rothschildi, Liomys adspersus, Heteromys australis, H. desmarestianus, Sciurus granatensis, Microsciurus alfari, Dasyprocta punctata, Rattus rattus, Sigmodon hispidus, Oryzomys caliginosus, O. capito, Nectomys alfari, Zygodontomys microtinus, Sylvilagus brasiliensis, Nasua nasua, Felis pardalis.*

Localities: Barro Colorado Island, Piña, Galeta Point, Fort Gulick, France Field, Fort Sherman, Fort Davis, Cacao Plantation, Summit, Madden Forest, Juan Mina, Miraflores, Pedro Miguel, Fort Clayton, Nuevo Emperador, Road K-9, Corte Culebra Road, Fort Kobbe, and Ancón Hill (Canal Zone); Coiba Island; Cerro Azul, Cerro Campana, Capira, Guayabito, and Madden Airstrip (Panamá); Cerro Pirre (Darién); Divisa and Parita (Herrera); Achiote (Colón); Cerro Hoya (Los Santos); Almirante, Río Changena, Cayo Agua, Escudo de Veraguas, and Isla Bastimentos (Bocas del Toro); Chiriquí Province. Common throughout the year, as suggested by miscellaneous collections made from 1954 to 1962.

Genus **Hoffmannina** Brennan and Jones

Hoffmannina Brennan and Jones, 1959, Ann. Ent. Soc. Amer., 52: 8.
Type-species: *Novotrombicula suriana* Hoffmann, 1954.

KEY TO PANAMANIAN SPECIES

With two genualae I.....*handleyi* Brennan and Jones
With three genualae I.....*suriana* (Hoffmann)

Hoffmannina handleyi Brennan and Jones

Hoffmannina handleyi Brennan and Jones, 1961, Jour. Parasit., 47, (1), pp. 111–112, fig. 7.

Thirty-two specimens in 16 lots off *Didelphis marsupialis, Peromyscus nudipes, Reithrodontomys* sp., El Hato, Bambito, and Cerro Punta (Chiriquí), 7 to 31 January, 26 April to May 1961. Brennan and Jones (1961a) report this species also from *Scotinomys teguina, Reithrodontomys mexicanus,* and *Heteromys desmarestianus,* all from the same general area in the Chiriquí Highlands.

Hoffmannina suriana (Hoffmann)

Novotrombicula suriana Hoffmann, 1954, Ann. Esc. Nac. Cienc. Biol. Mex., 8, (1–2), pp. 23–26, figs. 9–12.

Nine specimens identified off *Reithrodontomys sumichrasti,* Cerro Barú, 10500 feet (Chiriquí), 2 May 1960; 1 off *Scotinomys xerampelinus,* 7 off *Peromyscus nudipes,* 9 off *Reithrodontomys creper,* Boquete Trail (Chiriquí), 3 to 5 May 1961. First Panamanian records.

Intercutestrix, new genus

Type-species: *Euschoengastia tryssa* Brennan and Jones, 1961.

DIAGNOSIS: Intradermal trombiculine larvae with leg segmentation 7-6-6; legs without mastisetae, parasubterminala, and genualae II and III. Scutum much wider than deep, with five setae and expanded sensillae. Eyes present. Cheliceral blades with tricuspid cap. Palpal tarsus with four branched setae and a tarsala.

Intercutestrix tryssa (Brennan and Jones), *new combination.* Figure 18.

Euschoengastia tryssa Brennan and Jones, 1961, Acarologia, 3, (2), pp. 189–190, fig. 9.

Additional material from Panama has indicated the need for erecting a genus to receive this species which was described from a single Peruvian specimen off *Proechimys hendeei.* The conspecificity of this and the Panamanian form is evident, although as might be expected, the latter exhibits geographic variation and may be a subspecies. Here, as figured, the scutum is somewhat deeper and AM < AL. The dorsal setae are longer. Engorged specimens of both forms are circular in outline.

Forty-five specimens off (15) *Proechimys semispinosus,* all from Canal Zone: Fort Gulick, 9 March 1954, 7 December 1960, 14 and 15 December 1961; France Field, 8 September to 21 December 1961; Piña, 29 November and 29 August, 1961, 9 February 1962; Summit, 1 December 1960. One off

Oryzomys caliginosus, Cerro Azul (Panamá), 26 January 1956. Two off *Tylomys watsoni,* Piña (Canal Zone), 7 February 1962, and 4 off *Oryzomys capito,* Piña, 20 December 1960. First records for Panama.

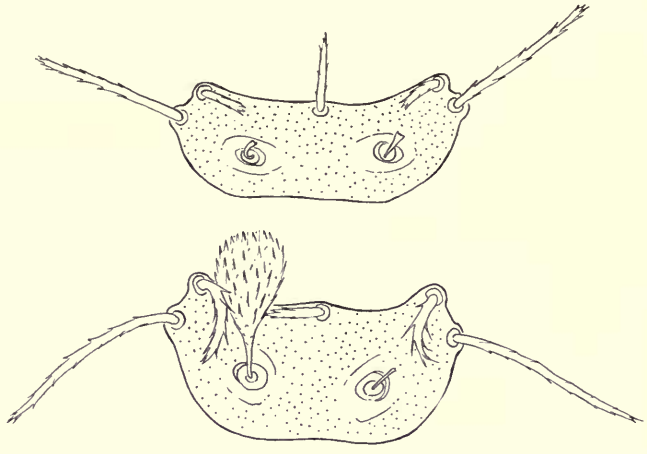

FIG. 18. *Intercutestrix tryssa* (Brennan and Jones). Scutum of holotype (Peru), above, and Panamanian form, below.

Genus **Leptotrombidium** Nagayo et al.

Leptotrombidium Nagayo et al., 1916, Dobutsugaku Zasshi, 28: 392.
Type-species: *Trombidium akamushi* Brumpt, 1910.

Leptotrombidium panamensis (Ewing)

Trombicula panamensis Ewing, 1925, Amer. Jour. Trop. Med., 5, (3), pp. 259–260.

About 160 specimens from 36 lots. Hosts: *Didelphis marsupialis, Marmosa robinsoni, Artibeus toltecus* (one specimen, Bocas del Toro), *Proechimys semispinosus, Hoplomys gymnurus, Heteromys australis, Liomys adspersus, Coendou rothschildi, Sigmodon hispidus, Oryzomys bombycinus, O. caliginosus, O. capito, Zygodontomys microtinus.*

Localities: Fort Sherman, Gamboa Road, Summit, Madden Forest, Pedro Miguel River, and Fort Kobbe (Canal Zone); Almirante and Río Changena (Bocas del Toro). Irregular collections from 1954 to 1962 suggest that peak activity of this species is during the dry season, January to April, although a few collections were made in June and September.

Myxacarus, new genus

Type-species: *Myxacarus oscillatus,* new species.

DIAGNOSIS: Intranasal trombiculine larvae with leg segmentation 7-7-7; legs without mastisetae and genualae II and III, but with tibiala III. Scutum subquadrate, with five setae and expanded sensillae. Eyes apparently absent. Cheliceral blades with a series of dorsal teeth of which the proximal is enlarged. Palpal tarsus with five branched setae and a tarsala; tibial claw bifurcate. Ventral humeral setae present.

Distinguished from *Blix* n. gen. by armature of cheliceral blades, special-

ized setation of legs, bifurcate palpaltibial claw, and ventral humeral setae.

Myxacarus oscillatus, new species. Figure 19.

DIAGNOSIS: Intranasal habitat. Scutum subquadrate with concave posterior margin and PL's arising from tubercles. Cheliceral blades with series of dorsal teeth. Two genualae I, no genualae II or III.

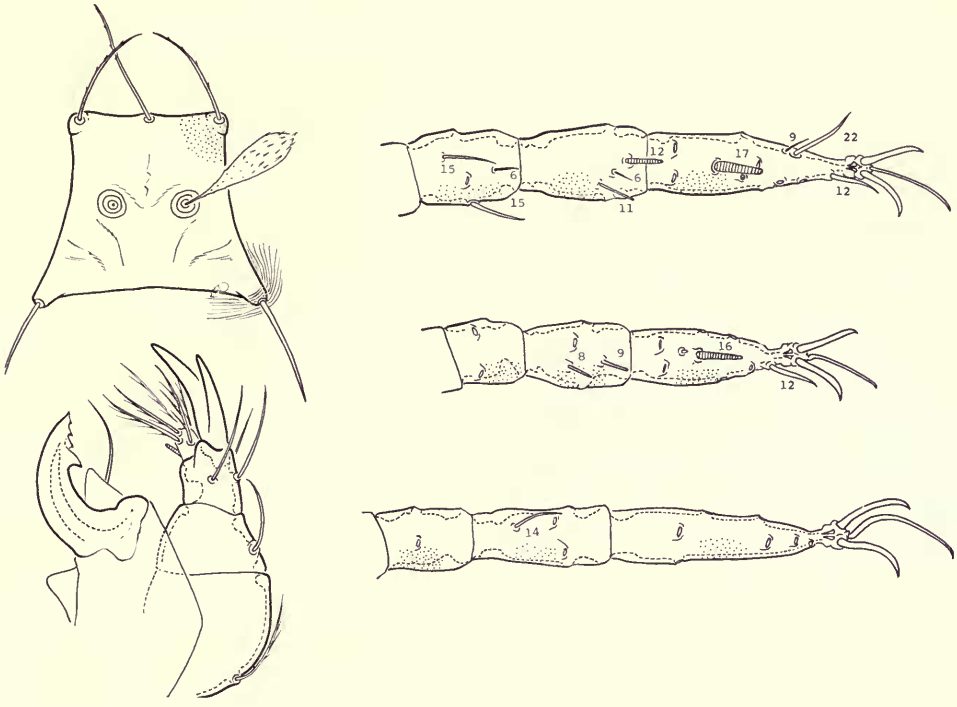

FIG. 19. *Myxacarus oscillatus,* new species. Scutum. Half of gnathosoma. Specialized setae of legs.

DESCRIPTION: *Idiosoma.*—Broad-ellipsoidal, slightly constricted. Length and width of holotype 610 by 390 μ. Eyes not seen. Anus at fourth row of ventral setae. *Scutum.*—Subquadrate with straight to concave posterior margin, densely punctate. Posterolateral angles produced and tuberculate. Anterior setae with distinct barbs, posterior setae apparently nude. Sensillae broadlanceolate, with minute setules. Measurements of holotype: AW 47, PW 76, SB 26, ASB 30, PSB 29, AP 57, AM 40, AL 40, PL 40, S 40 μ. *Gnathosoma.*—Densely punctate. Blades strong, with a large dorsal tooth on apical third, in front of which is a series of four or five smaller teeth. Galeal seta nude. Palpal setae B/N/NNN: tarsus with five branched setae and a tarsala; claw bifurcate. *Legs.*—Densely punctate. Specialized setae as figured. Non-specialized setae barbed to branched. Empodium long and slender. *Body setae.*—Dorsal setae with short barbs, 29 to 46 μ, arranged 2-6-6-4-2. Ventral setae, 2-2 sternals and three to four ventral humerals on each side between coxae II and III, plus 30. Postanals similar to dorsals.

TYPE MATERIAL: Holotype and a paratype, RML no. 44241, from nasal mucosa of *Proechimys semispinosus,* Summit (Canal Zone), 20 December

1961, MARU. Paratypes: 3, same host, Piña (Canal Zone), 20 December 1960, and Fort Gulick (Canal Zone), 6 January 1961, EHB; 11 off *Hoplomys gymnurus*, Piña, 6 December 1960, EHB; 1 off *Oryzomys capito*, Piña, 7 December 1960, EHB; 6 off *Dasypus novemcinctus*, Paraíso (Canal Zone), 15 February 1962, MARU; 1 off *Metachirus nudicaudatus*, Cerro Azul (Panamá), 16 March 1961, MARU. Holotype in the collection of the Rocky Mountain Laboratory. Paratypes in the Rocky Mountain Laboratory, United States National Museum, Chicago Natural History Museum, and the British Museum (Natural History).

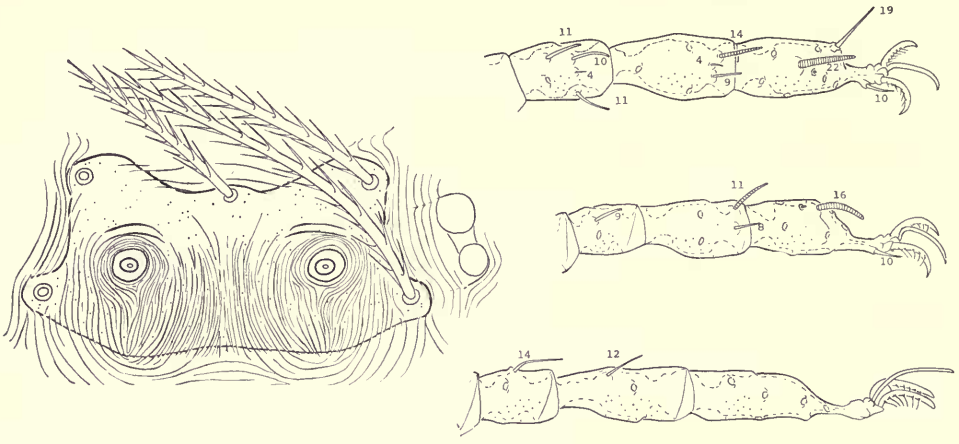

FIG. 20. *Neoschoengastia electron*, new species. Scutum and eyes. Specialized setae of legs.

Genus **Neoschoengastia** Ewing

Neoschoengastia Ewing, 1929, Man. Ext. Parasites, p. 187.

Type-species: *Schoengastia americana* Hirst, 1921.

Neoschoengastia electron, new species. Figure 20.

DIAGNOSIS: Three pairs of humeral setae, sternal setae 2-4, three genualae I, parasubterminala absent, coxa III with three setae.

DESCRIPTION: *Idiosoma.*—Broad-ellipsoidal. Eyes 2/2, in a plate. Length and width of holotype, 587 by 400 μ. Anus at sixth row of ventral setae. *Scutum.*—Wider than long, with sinuous margins, puncta large, whorls of cuticular striations cover posterior two-thirds of scutum. Setae long, with semi-appressed branches. Sensillae missing. Measurements of holotype: AW 62, PW 83, SB 44, ASB 24, PSB 20, AP 27, AM 39, AL 57, PL 78, S– μ. *Gnathosoma.*—Punctate. Blades with tricuspid cap. Palpal setae B/B/NNB; tarsus with five branched setae, a subterminala, and a tarsala; claw trifurcate. Galeal seta branched. *Legs.*—Punctate. Specialized setae as figured. No parasubterminala. Non-specialized setae moderately branched. Coxa III with three setae. Tarsal claws with tenent hairs. *Body setae.*—Dorsal setae 50 to 75 μ, arranged approximately 6-9-8-2-7-5-4-4. Ventral setae, 2-4 sternals plus 52, postanals like dorsals.

TYPE MATERIAL: Holotype, RML no. 44332, off *Electron platyrhynchum*,

Cacao Plantation Road (Canal Zone), 2 February 1962, MARU. In the collection of the Rocky Mountain Laboratory.

Genus **Perates** Brennan and Dalmat

Perates Brennan and Dalmat, 1960, Ann. Ent. Soc. Amer., 53: 186.
Type-species: *Perates insessus* Brennan and Dalmat, 1960.

Perates insessus Brennan and Dalmat

Perates insessus Brennan and Dalmat, loc. cit., p. 187, fig. 5.

Eleven specimens off (3) *Pteronotus psilotis,* Penonomé (Coclé), 30 January and 8 February 1962. First Panamanian records.

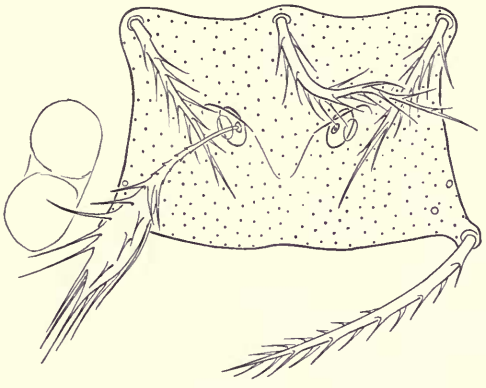

FIG. 21. *Perissopalla precaria* (Brennan and Dalmat). Scutum and eyes.

Genus **Perissopalla** Brennan and White

Perissopalla Brennan and White, 1960, Jour. Parasit., 46: 346.
Type-species: *Perissopalla flagellisetula* Brennan and White, 1960.

Perissopalla precaria (Brennan and Dalmat), *new combination.* Figure 21.

Euschoengastia precaria Brennan and Dalmat, 1960, Ann. Ent. Soc. Amer., 53, (2), p. 190, fig. 9.

Eighteen specimens off *Micronycteris megalotis,* Pacora (Panamá), 31 October 1960. This species is transferred to the genus *Perissopalla* Brennan and White on the basis of a specimen in the above series that bears sensillae. Previous specimens lacked these structures. First record for Panama.

Genus **Polylopadium** Brennan and Jones

Polylopadium Brennan and Jones, 1961, Jour. Parasit., 47: 112.
Type-species: *Polylopadium kramisi* Brennan and Jones, 1961.

The discovery of a second species of *Polylopadium, P. confirmatum* n. sp., permits a revision of the generic diagnosis as follows:

Trombiculine larvae with dorsal pattern of platelets in addition to scutum. Scutum with five short inconspicuously barbed setae, sensillae expanded. Eyes present or absent. Dorsal setae short and barbed, similar to scutals. Cheliceral blades with tricuspid cap. Palpal tibial claw trifurcate. Leg segmentation 7-6-6.

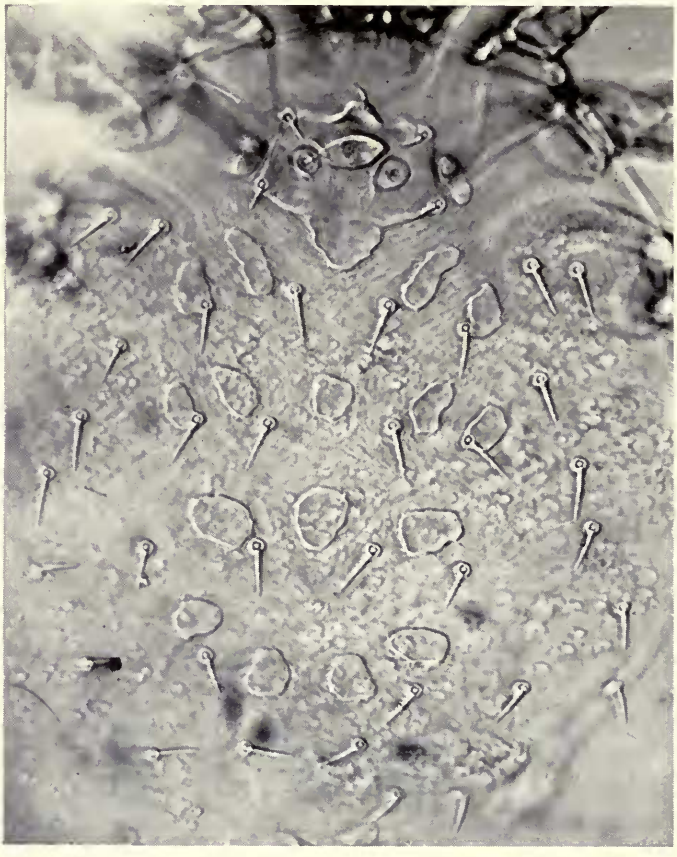

FIG. 22. *Polylopadium confirmatum*, new species. Dorsum, showing scutum and platelets. Oblique lighting photomicrograph by N. J. Kramis.

KEY TO PANAMANIAN SPECIES

With 11 dorsal platelets; eyes absent; genualae II and III absent.....
.....*kramisi* Brennan and Jones
With 16 dorsal platelets; eyes present; genualae II and III present.....
.....*confirmatum* n. sp.

Polylopadium confirmatum, new species. Figures 22, 23.

DIAGNOSIS: Dorsum with 16 platelets, two genualae I and a genuala II and III, eyes present.

DESCRIPTION: *Idiosoma.*—Ovate. Eyes 2/2, in a plate, posterior pair obsolescent. Dorsum with 16 small platelets arranged as figured. Length and width of holotype, partly engorged, 315 by 235 μ. Anus at seventh row of ventral setae. *Scutum.*—Trape-

zoidal, with anteromedian and posteromedian extensions, as figured. Setae short and barbed. Sensillae oblanceolate, setules conspicuous. Measurements of holotype: AW 46, PW 59, SB 30, ASB 23, PSB 33, AP 21, AM 7, AL 8, PL 10, S 28 μ. *Gnathosoma.*—Cheliceral blade with tricuspid cap and small ventral notch. Palpal setae B/B/BBB; claw trifurcate; tarsus with five branched setae and a tarsala. Galeal seta nude. *Legs.*—With fine puncta. Specialized setae as figured. Non-specialized setae sparsely branched. *Body setae.*—Dorsal setae short, barbed, 14 to 18 μ, arranged in the holotype 4-6-6-2-6-4-4-2. Ventral setae, 2-2 sternals plus 38, sternals with few pronounced branches similar to coxal setae, postanals similar to dorsals.

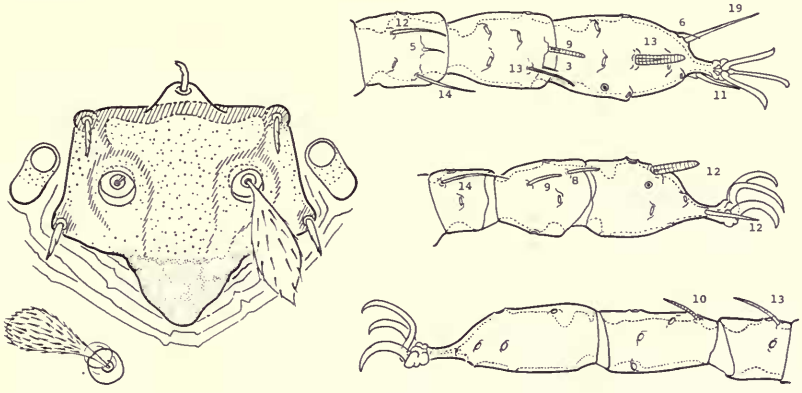

FIG. 23. *Polylopadium* species. Scutum and eyes of *P. confirmatum*, new species. Sensilla of *P. kramisi* Brennan and Jones. Specialized setae of legs of *P. confirmatum*.

TYPE MATERIAL: Holotype, RML no. 43719, off *Oryzomys caliginosus*, near Río Changena (Bocas del Toro), 21 September 1961. Two paratypes, same host and locality, 26 and 27 September 1961, EHB. Holotype in the collection of the Rocky Mountain Laboratory. Paratypes in the Rocky Mountain Laboratory and the United States National Museum.

Polylopadium kramisi Brennan and Jones. Figure 23.

Polylopadium kramisi Brennan and Jones, 1961, Jour. Parasit., 47, (1), pp. 112–113, figs. 8, 9.

Off (4) *Liomys adspersus* in the Canal Zone: 2 specimens, Curundu, 3 October 1961; 8 specimens, Summit, 27 and 28 December 1961; 3 specimens, Cacao Plantation, 31 January 1962. Also reported by Brennan and Jones (1961a) from *Proechimys semispinosus*, Canal Zone, and from *Peromyscus* sp., Chiriquí Province.

A specimen bearing sensillae permits us to illustrate this structure.

Genus **Pseudoschoengastia** Lipovsky

Pseudoschoengastia Lipovsky, 1951, Jour. Kans. Ent. Soc., 24: 95.

Type-species: *Pseudoschoengastia hungerfordi* Lipovsky, 1951.

KEY TO PANAMANIAN SPECIES

1. With one genuala I; genualae II and III absent.....*mermeriza* n. sp.
   With two or three genualae I; genualae II and III present..... 2

2. PL's on scutum; parasubterminala branched; one pair of humeral setae...*apista* n. sp.
   PL's off scutum; parasubterminala nude; two pairs of humeral setae..... 3
3. Eyes absent .....*finitima* n. sp.
   Eyes present 4
4. With two genualae I; idiosomal setae arise from deep, wide pits.....*dasypi* n. sp.
   With three genualae I; idiosomal setal bases normal..... 5
5. Sensillae capitate, a small bulb at base; palpal genual and tibial setae branched; AL's much longer than PL's.....*bulbifera* Brennan
   Sensillae obovate, no bulb at base; palpal genual tibial and setae nude; AL's shorter than PL's 6
6. About 48 short dorsal setae; SB = 18 μ.....*abditiva* Brennan
   About 60 longer dorsal setae; SB = 28 μ.....*zona* Brennan

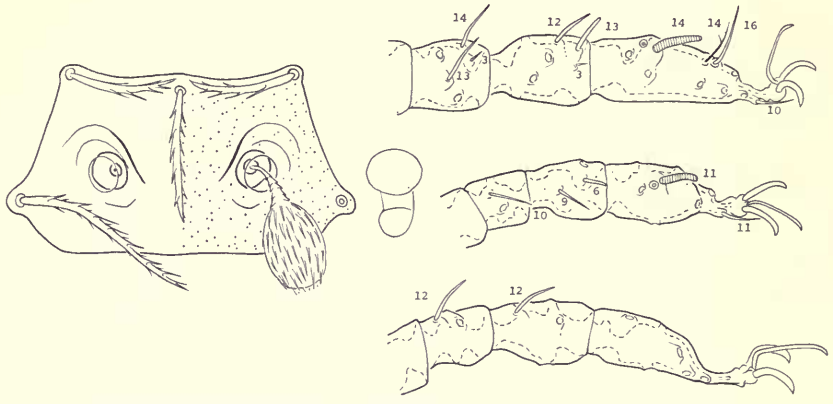

FIG. 24. *Pseudoschoengastia apista*, new species. Scutum and eyes. Specialized setae of legs.

Pseudoschoengastia abditiva Brennan

Pseudoschoengastia abditiva Brennan, 1960, Acarologia, 2, (4), pp. 482-483, fig. 1.

Known only from the type series, 4 specimens off *Oryzomys capito*, Cerro Azul (Panamá), 8 February 1956.

Pseudoschoengastia apista, new species. Figure 24.

DIAGNOSIS: Related to *P. inevicta* Brennan from which it differs by nude dorsotibial palpal seta, branched parsubterminala, leg segmentation 7-7-7, and tarsala I longer than tarsala II. Distinguished from all other members of the genus by having only one pair of humeral setae.

DESCRIPTION: *Idiosoma.*—Broad-ovate. Length and width of holotype, engorged, 345 by 255 μ. Eyes large, 2/2, in a plate. Anus at fourth row of ventral setae. *Scutum.*—As figured, with sinuous margins, moderately punctate. Posterolateral setae on scutum. Sensillae obovate, densely setulose on anterior surface, fewer and larger setules on posterior surface, stems barbed nearly to base. Measurements of holotype: AW 46, PW 64, SB 29, ASB 21, PSB 16, AP 28, AM 25, AL 19, PL 30, S 30 μ. *Gnathosoma.*—Moderately punctate. Cheliceral blades with tricuspid cap and dorsal and ventral tooth. Galeal seta nude, sometimes forked. Palpal setae B/B/NNB; tarsus with five branched setae and a tarsala; claw trifurcate. *Legs.*—Punctate. Segmentation 7-7-7. Specialized setae as figured, parasubterminala forked or branched. Non-specialized setae moderately and conspicuously

branched. *Body setae.*—Dorsal setae short, with conspicuous branches, 24 to 32 μ, arranged 2-8-2-8-2-6-6-4. Ventral setae, 2-2 sternals plus 40, postanals similar to dorsals, two or three ventral humerals on each side between coxae II and III.

TYPE MATERIAL: Holotype and 8 paratypes, RML no. 44654, off *Dasypus novemcinctus,* Paraíso (Canal Zone), 26 March 1962, MARU. Holotype, in the collection of the Rocky Mountain Laboratory. Paratypes in the Rocky Mountain Laboratory, United States National Museum, British Museum (Natural History), and the Chicago Natural History Museum.

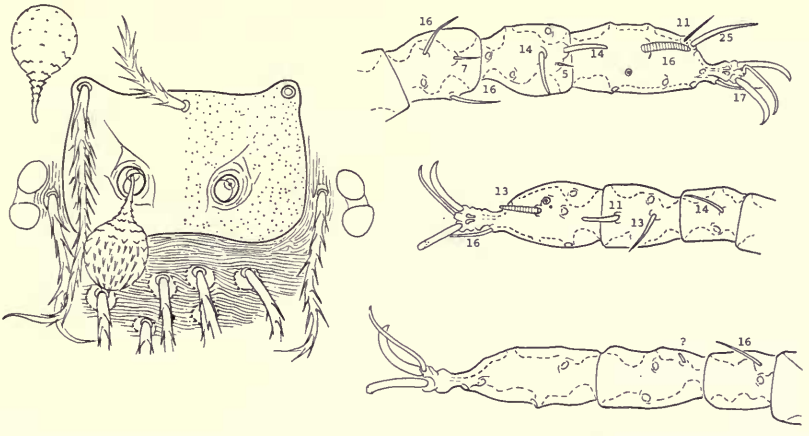

FIG. 25. *Pseudoschoengastia dasypi,* new species. Posterior aspect of sensilla. Scutum and eyes; bases of dorsal setae; sensilla, anterior surface. Specialized setae of legs.

Pseudoschoengastia bulbifera Brennan

Pseudoschoengastia bulbifera Brennan, 1960, Acarologia, 2, (4), pp. 483–484, fig. 2.

About 425 specimens identified from 135 lots. Hosts: REPTILES, *Sceloporus* sp.; MAMMALS, *Didelphis marsupialis, Marmosa mexicana, M. robinsoni, Philander opossum, Cryptotis* sp., *Sturnira ludovici, Saguinus geoffroyi, Proechimys semispinosus, Heteromys australis, H. desmarestianus, Liomys adspersus, Hoplomys gymnurus, Sigmodon hispidus, Oryzomys alfaroi, O. bombycinus, O. caliginosus, O. albigularis, O. capito, Oryzomys* sp., *Peromyscus nudipes, Peromyscus* sp., *Reithrodontomys* sp., *Scotinomys xerampelinus, Zygodontomys microtinus, Nectomys alfari.*

Localities: Piña, Miraflores, Summit, and Corte Culebra Road (Canal Zone); Cerro Azul (Panamá); Isla Bastimentos and Río Changena (Bocas del Toro); Cerro Pirre (Darién); Boquete Trail, Cerro Punta, Bambito, and El Hato (Chiriquí). See Brennan (1960) for other Panamanian records. In miscellaneous collections made from 1954 to 1962, this species was found in all months except June, July and August.

Pseudoschoengastia dasypi, new species. Figure 25.

DIAGNOSIS: Separated from other species of the genus by coarsely branched idiosomal setae arising from deep, wide pits. It is related to

P. guatemalensis Brennan from which it differs by wider scutum in proportion to depth, more widely separated sensillary bases, and more and larger idiosomal setae.

DESCRIPTION: *Idiosoma.*—Ovate. Length and width of holotype, slightly engorged, 237 by 165 μ. Eyes large, 2/2, in a plate. Anus at fourth row of ventral setae. *Scutum.*—Conspicuously punctate, as figured; extrascutal PL'S coarsely branched setae. Sensillate capitate, anterior surface moderately setulose and with small setules sparsely distributed on posterior surface. Measurements of holotype: AW 55, SB 29, ASB 29, PSB 19, AM 32, AL 73, PL 53, S 32 μ. *Gnathosoma.*—Conspicuously punctate. Cheliceral blades

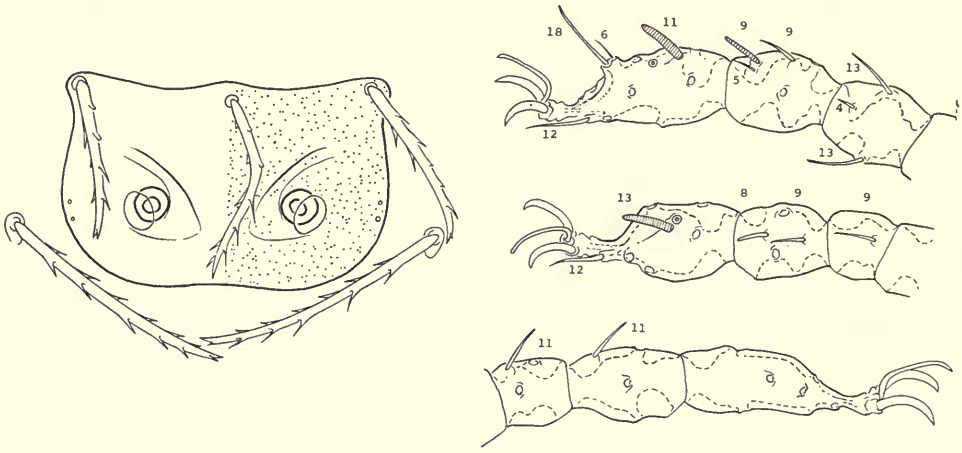

FIG. 26. *Pseudoschoengastia finitima,* new species. Scutum. Specialized setae of legs.

with tricuspid cap and minute subapical dorsal and ventral teeth. Galeal seta nude. Palpal setate B/B/BNB; tarsus with five branched setae and a tarsala; claw trifurcate. *Legs.*—Punctate. Leg segmentation 7-6-6. Specialized setae as figured. Non-specialized setae coarsely branched. *Body setae.*—Dorsal setae coarsely branched, arising from deep, wide pits, 33 to 50 μ, 2-2 humerals plus about 70. Ventral setae, 2-2 sternals, 2-2 ventral humerals, plus about 60. These also arise from wide pits.

TYPE MATERIAL: Holotype and 4 paratypes, RML no. 44654, off *Dasypus novemcinctus,* Paraíso (Canal Zone), 26 March 1962, MARU. In the collection of the Rocky Mountain Laboratory. All specimens in fair to poor condition.

Pseudoschoengastia finitima, new species. Figure 26.

DIAGNOSIS: Distinguished from all other species of the genus by the absence of eyes, and from *P. farneri* Lipovsky by the more appressed branches of branched setae, wider scutum in proportion to depth, and smaller tarsalae I and II.

DESCRIPTION: *Idiosoma.*—Broad-ovate, slightly constricted. Length and width of holotype, engorged, 400 by 260 μ. Eyes absent. Anus at about fifth row of ventral setae. *Scutum.*—As figured, PL's extrascutal, sensillae broken off throughout the series. Measurements of holotype: AW 47, SB 25, ASB 21, PSB 10, AM 33, AL 24, PL 42, S– μ. *Gnathosoma.*—Punctate. Cheliceral blades with tricuspid cap, and apparently without additional teeth. Galeal seta nude. Palpal setae B/N/BNB; tarsus with five branched setae

and a tarsala; claw trifurcate. *Legs.*—Leg segmentation 7-6-6. Specialized setae as figured. Non-specialized setae moderately branched. *Body setae.*—Dorsal setae 32 to 40 μ, 2-2 humerals plus about 50. Ventral setae, 2-2 sternals, 2-2 humerals, plus 60.

TYPE MATERIAL: Holotype and 7 paratypes, RML no. 40112, off *Heteromys desmarestianus,* Piña (Canal Zone), 7 December 1960. Two paratypes, same host and locality, 29 December 1961, EHB. Holotype in the collection of the Rocky Mountain Laboratory. Paratypes in the Rocky Laboratory, United States National Museum, British Museum (Natural History), and the Chicago Natural History Museum.

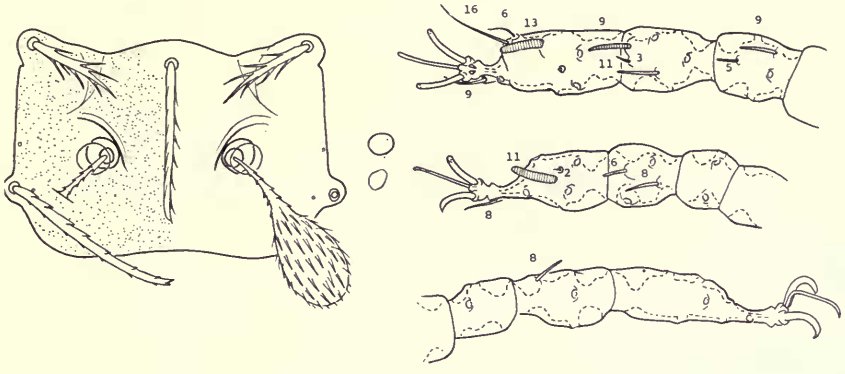

FIG. 27. *Pseudoschoengastia mermeriza,* new species. Scutum and eyes. Specialized setae of legs.

Pseudoschoengastia mermeriza, new species. Figure 27.

DIAGNOSIS: Similar to *P. aberrans* Brennan and Jones (PL's on deep-narrow scutum, palpal setation, one genuala I, no genualae II and III, and small eyes) but a distinct form with leg segmentation apparently 7-7-6, all branched setae with more appressed and shorter branches and different arrangement of dorsal setae.

DESCRIPTION: *Idiosoma.*—Broad-ovate. Length and width, partly engorged, 285 by 206 μ. Eyes small, 2/2, posterior pair obsolescent. Anus at fourth row of ventral setae. *Scutum.*—As figured, punctate, deep-narrow. Posterolateral setae on scutum. Sensillae obovate, with large setules, anterior surface completely covered, posterior surface with a denuded median area, stems barbed nearly to their bases. Measurements: AW 41, PW 50, SB 19, ASB 20, PSB 17, AP 23, AM 24, AL 12, PL 31, S 29 μ. *Gnathosoma.*—Moderately punctate. Cheliceral blades with tricuspid cap and a ventral tooth. Galeal seta nude. Palpal setate B/N/NNB; tarsus with five branched setae and a tarsala; tibal claw trifurcate. *Legs.*—Punctate. Segmentation 7-7-6. Specialized setae as figured. Non-specialized setae moderately branched. *Body setae.*—Dorsal setae similar to PL's with short appressed branches, 19 to 28 μ arranged 4-4-6-8-2-8-6-4-2. Ventral setae, 2-3 (can be interpreted as 2-2 or 2-4) plus 32, postanals similar to dorsals, two ventral humerals on each side between coxae II and III.

TYPE MATERIAL: Holotype, RML no. 44508, off *Coendou rothschildi,* Paraíso (Canal Zone), 26 February 1962, MARU. In the collection of the Rocky Mountain Laboratory.

Pseudoschoengastia zona Brennan

Pseudoschoengastia zona Brennan, 1960, Acarologia, 2, (4), pp. 490–492, fig. 8.

Five specimens off *Liomys adspersus,* Nuevo Emperador (Canal Zone), 7 August 1961; 3 off same host, Summit (Canal Zone), 27 and 28 December 1961; 1 off *Heteromys australis,* Cerro Pirre (Darién), 3 February 1961; 1 off *Oryzomys caliginosus,* Río Changena (Bocas del Toro), 23 September 1961. In addition, reported by Brennan (1960) from *Sigmodon hispidus* and *Tylomys panamensis.*

Genus **Speleocola** Lipovsky

Speleocola Lipovsky, 1952, Jour. Kans. Ent. Soc., 25: 132.

Type-species: *Speleocola tadaridae* Lipovsky, 1952.

Speleocola secunda Brennan and Jones

Speleocola secunda Brennan and Jones, 1960, Acarologia, 2, (4), pp. 509-510, fig. 8.

Three specimens off *Coendou rothschildi,* along Pedro Miguel River (Canal Zone), 20 March 1962. First record for Panama.

Genus **Tecomatlana** Hoffmann

Tecomatlana Hoffmann, 1947, An. Esc. Nac. Cienc. Biol. Mex., 4, (4), p. 451.

Type-species: *Tecomatlana sandovali* Hoffmann, 1947.

Tecomatlana sandovali Hoffmann

Tecomatlana sandovali Hoffmann, loc. cit., pp. 452–457, figs. 1–6.

Six specimens off *Peropteryx macrotis,* Buena Vista (Colón), 29 October 1959; 5 off undetermined bats, cave near Quebrada Bonita (Panamá), 16 February 1962. First records for Panama.

Genus **Blankaartia** Oudemans

Blankaartia Oudemans, 1911, Ent. Ber., 3: 123.

Type-species: *Trombidium niloticum* Trägårdh, 1905.

KEY TO PANAMANIAN SPECIES

1. Sensillae nude; all setae of palpal tarsus nude ..... *marui* n. sp.
   Sensillae branched, at least some setae of palpal tarsus branched 2
2. Palpal tibial claw bifurcate; palpal genual seta nude: galeal seta nude; tarsala I extremely long (>50 μ) ..... *wetmorei* n. sp.
   Palpal tibial claw trifurcate; palpal genual seta branched; galeal seta forked or branched; tarsala I not unusually long 3
3. Scutum not pentagonal, its posterior margin broadly curved ..... *arremonops* (Brennan and Jones)
   Scutum pentagonal 4
4. Posterior angle of scutum acute ..... *attenuata* (Michener)
   Posterior angle of scutum not acute 5
5. Length of tarsala I about 20 μ ..... *alleei* (Ewing)
   Length of tarsala I about 15 μ 6
6. Large, heart-shaped species (length, engorged, may exceed 1 mm.) ..... *sinnamaryi* (Floch and Fauran)
   Smaller species, not heart-shaped ..... *velascoi* (Boshell and Kerr)

Blankaartia alleei (Ewing)

Trombicula alleei Ewing, 1926, Ent. News, 37: 111–112.

Ten specimens off *Hydrochaeris hydrochaeris,* Cerro Pirre (Darién), 7 February 1961. This species was described from a single adult from Barro Colorado Island. For additional information, including larval records from Panama, see Michener (1946) who gives biologic data and shows that the larvae are characteristically parasitic on birds.

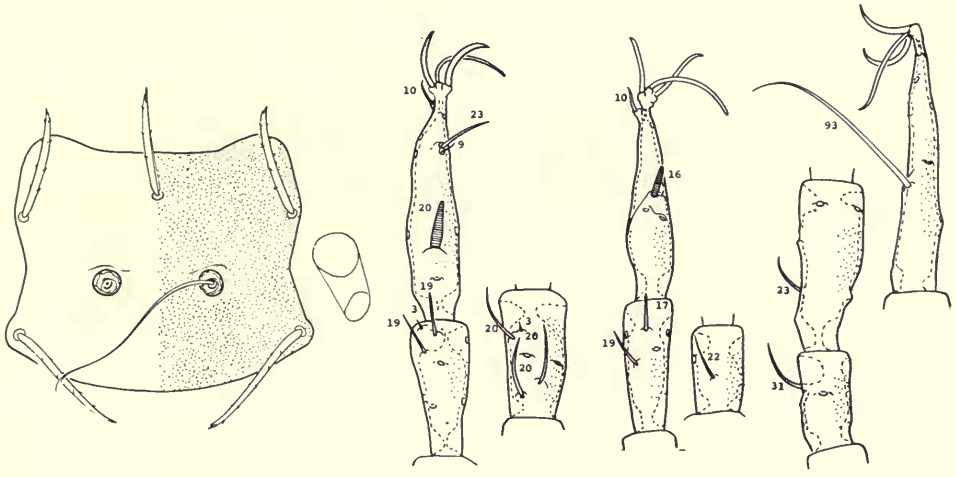

FIG. 28. *Blankaartia marui,* new species. Scutum and eyes. Specialized setae of legs.

Blankaartia arremonops (Brennan and Jones), *new combination.*

Trombicula arremonops Brennan and Jones, 1961, Jour. Parasit., 47, (2), pp. 114–115, fig. 10.

Known only from the holotype off *Arremonops conirostris,* Cacao Plantation (Canal Zone), 4 May 1955.

Blankaartia attenuata (Michener)

Trombicula (*Megatrombicula*) *attenuata* Michener, 1946, Ann. Ent. Soc. Amer., 39, (3), pp. 440–444, figs. 12–17, 22.

The description of this species is based principally on adults of both sexes, found only on floating plants of water lettuce (*Pistia stratiotes*), Juan Mina (Canal Zone), September and October 1945. Larvae, obtained by rearing, were briefly described. The holotype is a male, the allotype a female. Hosts are unknown. No additional records.

Blankaartia marui, new species. Figure 28.

DIAGNOSIS: Distinguished from all other species by the nude sensillae and nude setae of palpal tarsus; in addition, distinguished from *wetmorei* n. sp. by the greater number of body setae and much shorter tarsala I.

DESCRIPTION: *Idiosoma.*—Ellipsoidal. Length and width of holotype 885 by 463 μ.

Eyes prominent, 2/2, in a plate, the anterior larger. Anus at fourth row of ventral setae. *Gnathosoma.*—Densely and conspicuously punctate. Chelicerae long and narrow, blades long, with tricuspid cap. Palpal setae B/N/NNN; tarsus with six nude setae, a subterminala and a tarsala; claw bifurcate. Galeal seta nude. *Scutum.*—As figured, nearly quadrate, with shallow curving posterior margin, densely punctate. Setae with appressed branches, AM and AL's considerably removed from anterior margin. Sensillae thread-like, nude. Measurements of holotype: AW 99, PW 100, SB 36, ASB 52, PSB 41, AP 44, AM 40, AL 40, PL 51, S 88 μ. *Legs.*—Long, conspicuously punctate. Specialized setae as figured. Non-specialized setae long, sparsely branched, some seemingly nude. *Body setae.*—Dorsal setae with appressed branches, 42 to 55 μ, arranged 2-6-6-6-4-2-2. Ventral setae, 2-2 sternals plus 36.

TYPE MATERIAL: Holotype and a paratype, RML no. 40982, off *Nycticorax nycticorax,* Cerro Azul (Panamá), 29 May 1961; one paratype, same collecting data, MARU. Holotype in the collection of the Rocky Mountain Laboratory. Paratypes in the Rocky Mountain Laboratory and the United States National Museum.

Blankaartia sinnamaryi (Floch and Fauran)

Trombicula (*Tragardula*)! *sinnamaryi* Floch and Fauran, 1956, Arch. Inst. Pasteur Guyane Franç. et Inini, no. 405, pp. 3–7, figs. 1–5.

About 200 specimens identified from 47 lots. Hosts: BIRDS, *Anhinga anhinga, Aramides cajanea, Ciccaba virgata, Otus guatemalae, Caprimulgus rufus, Nyctidromus albicollis, Trogon massena, Baryphthengus ruficapillus,* Bucconidae sp., *Monasa morphoeus, Catharus mexicanus, Dendrocincla homochroa, Dumetella carolinensis, Dysithamnus mentalis, Geothlypis semiflava, Hylocichla ustulata, Icterus mesomelas, Microbates cinereiventris, Myiarchus ferox, Myiozetetes* sp., *Oporornis formosus, Piranga rubra, Sclerurus guatemalensis, Sporophila aurita corvina, Taraba major, Xiphorhynchus guttatus;* MAMMALS, *Phyllostomus hastatus.*

Localities: Juan Mina, Nuevo Emperador, Cacao Plantation, and Rodman Naval Base (Canal Zone); Madden Airstrip and Pacora (Panamá); Almirante and Río Changena (Bocas del Toro); Coiba Island. From 1956 to 1962, taken in all months of the year except March, April, May, and July.

Blankaartia velascoi (Boshell and Kerr)

Trombicula velascoi Boshell and Kerr, 1942, Rev. Acad. Colomb. Cienc. Exacta, Fisico-Quim. y Nat., 5, (17), pp. 9–10 (in reprint).

Described from 8 adults from Colombia. The only known larval records of this species are those of Michener (1946) from Panama. Michener also gives interesting biologic findings, e.g., the collecting of 4 larvae from the branches of a mango tree, and lists numerous bird hosts.

Blankaartia wetmorei, new species. Figure 29.

DIAGNOSIS: Distinguished from all other species of *Blankaartia* by the extremely long tarsala I (about 60 μ), and from all except *marui* n. sp. by the nude palpal genual and tibial setae and the bifurcate palpal tibial claw.

DESCRIPTION: *Idiosoma.*—Elliptical, red in life. Length and width of holotype 650 by 425 μ. Eyes 2/2, in a plate. Anus at fourth row of ventral setae. *Gnathosoma.*—Punctate. Chelicerae and cheliceral blades elongate, the latter with tricuspid cap. Galeal seta

nude. Palpal setae B/N/NNN: tarsus with six setae (four branched and two apparently nude) a subterminala and a tarsala; claw bifurcate. *Scutum.*—Densely punctate, with broadly curved posterior angle. Setae with appressed barbs, AM and AL's posterior to margin. Sensillae branched. Measurements of holotype: AW 93, PW 100, SB 37, ASB 42, PSB 36, AP 35, AM 42, AL 40, PL 57, S 50 μ. *Legs.*—Punctate. Specialized setae as figured, tarsala I extremely long. Non-specialized setae long and with few branches. *Body setae.*—Dorsal setae with appressed barbs, 40 to 55 μ, arranged 2-6-6-4-2. Ventral setae, 2-2 sternals plus 16.

TYPE MATERIAL: Holotype and 3 paratypes, RML no. 43234, off *Nyctanassa violacea,* Fort Kobbe (Canal Zone), 20 July 1961, Frank Todd, collector. Holotype in the collection of the Rocky Mountain Laboratory. Paratypes in the Rocky Mountain Laboratory and the United States National Museum.

Named for Dr. Alexander Wetmore, who graciously identified all bird hosts.

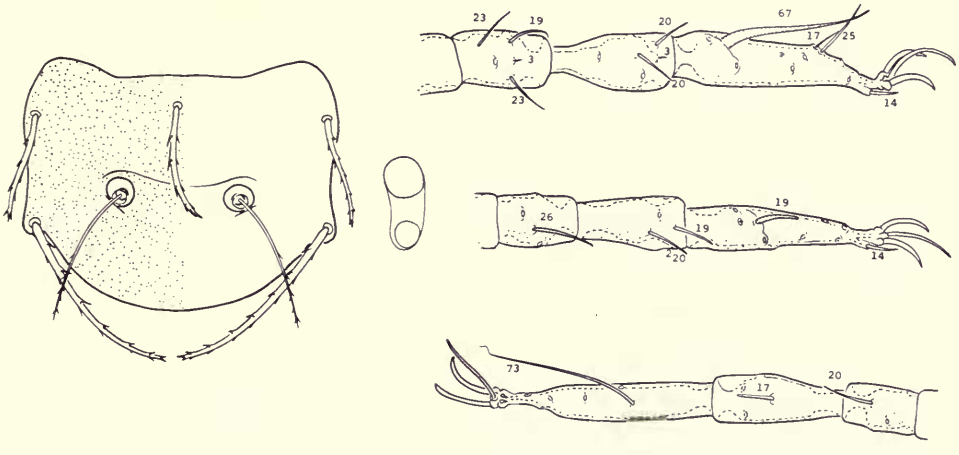

FIG. 29. *Blankaartia wetmorei,* new species. Scutum and eyes. Specialized setae of legs.

Genus **Trombicula** Berlese (*sensu lato*)

Trombicula Berlese, 1905, Redia, 2: 155.

Type-species: *Trombicula minor* Berlese, 1905.

KEY TO PANAMANIAN SPECIES

1. Palpal tibial claw bifurcate; parasubterminala branched..... *dicrura* Brennan and Jones
   Palpal tibial claw trifurcate; parasubterminala nude..... 2
2. Mastitarsala III present..... 3
   Mastitarsala III absent..... 13
3. With five genualae I; on bats..... *saccopteryx* Brennan and Jones
   With two or three genualae I..... 4
4. Galeal seta branched..... *pecari* Brennan and Jones
   Galeal seta nude..... 5
5. With two genualae I..... 6
   With three genualae I..... 8
6. Eyes absent, palpal femur and genu flattened and with pronounced lateral angles..... *anophthalma* Hoffmann

Eyes present; palpal femur and genu normal 7
7. Dorsal formula begins 2-6 ..... *dunni* Ewing
Dorsal formula begins 2-8 ..... *cribanus* Brennan and Jones
8(5). All palpal tibial setae nude; genuala III unusually long; on bats ..... *vesperuginis* Brennan and Jones
Not all palpal tibial setae nude; genuala III of normal length 9
9. Dorsal formula begins 2-4 or 4-4 ..... *keenani* Brennan and Jones
Dorsal formula begins 2-6 10
10. Palpal tarsus with five branched setae; sensillae with two long branches; eyes not in a plate; on bats ..... *carmenae* Brennan and Jones
Palpal tarsus with seven branched setae; sensillae with several branches of moderate length; eyes in a plate 11
11. Posterior scutal margin sinuous; AL's considerably behind margin of scutum; on bats ..... *soucouyanti* n. sp.
Posterior scutal margin broadly rounded; AL's not set far behind scutal margin; on rodents 12
12. Palpal laterotibial seta branched; scutum sparsely punctate; scutal setae slender, with semi-appressed branches; AM < AL ..... *chiriquensis* Brennan and Jones
Palpal laterotibial seta nude; scutum densely punctate; scutal setae thick, with appressed barbs; AM > AL ..... *caccabulus* Brennan and Jones
13(2). With three pairs of sternal setae ..... *liomys* Brennan and Jones
With two pairs of sternal setae 14
14. Palpal femoral seta nude; two genualae I ..... *tiptoni* Brennan and Jones
Palpal femoral seta branched, or at least delicately barbed; three genualae I .. 15
15. Galeal seta branched; eyes absent; palpal femur and genu with prominent lateral angles; on bats ..... *tibbettsi* Brennan and White
Galeal seta nude; eyes present; palpal femur and genu without lateral angles. 16
16. With a single pair of eyes 17
With two pairs of eyes in plates 18
17. Sensillae nude; posterior margin of scutum nearly straight; palpal genual seta nude; on bats ..... *monops* Brennan and Jones
Sensillae branched; posterior margin of scutum sharply angulate; palpal genual seta branched; on rodents ..... *punctata* Boshell and Kerr
18(16). Palpal ventrotibial seta branched; posterior scutal margin broadly rounded; AL's set in anterolateral angles ..... *dasyproctae* Ewing
Palpal ventrotibial seta nude; posterior scutal margin sinuous; AL's set behind margin 19
19. Palpal tarsala extremely long; on tree-frequenting animals ..... *longicalcar* Brennan and Jones
Palpal tarsala of normal length; on various animals .. *manueli* Brennan and Jones

Trombicula anophthalma Hoffmann

Trombicula anophthalma Hoffmann, 1960, Ciencia (Mex.), **20**, (3–4), pp. 102–103, figs. 11–13.
Euschoengastia anops Brennan and Jones, 1960, Acarologia, **2**, (4), pp. 498–500, fig. 2. *New synonymy.*

Two specimens identified off *Pteronotus parnellii,* Chilibrillo Caves, Chilibre (Panamá), 2 August 1960. First Panamanian record.

Trombicula caccabulus Brennan and Jones

Trombicula caccabulus Brennan and Jones, 1961, Jour. Parasit., **47**, (1), pp. 115–116, fig. 11.

Forty-seven specimens identified from 13 lots. Hosts: *Peromyscus*

nudipes, Scotinomys teguina. Localities: Bambito and Cerro Punta (Chiriquí). Active during the dry season, January to May. In addition, Brennan and Jones (1961a) report *T. caccabulus* from *Oryzomys fulvescens* and *Reithrodontomys mexicanus.*

Trombicula carmenae Brennan and Jones

Trombicula carmenae Brennan and Jones, 1960, Acarologia, 2, (4), p. 513, fig. 10.

Ten specimens off *Phyllostomus hastatus,* Pacora (Panamá), 6 June 1961; 1 off *Sturnira ludovici,* Bambito (Chiriquí), 24 April 1961; 1 off *S. ludovici* and 4 off *Artibeus jamaicencis,* Río Changena (Bocas del Toro), 19 September 1961. First records for Panama.

Trombicula chiriquensis Brennan and Jones

Trombicula chiriquensis Brennan and Jones, 1961, Jour. Parasit., 47, (1), pp. 116–117, fig. 12.

Two specimens off *Scotinomys teguina,* Cerro Punta (Chiriquí), 26 and 28 April 1961. Brennan and Jones (1961a) also record this species from *Peromyscus* sp. and *Reithrodontomys* sp.

Trombicula cribanus Brennan and Jones

Trombicula cribanus Brennan and Jones, 1961, loc. cit., pp. 117–118, fig. 13.

Known only from the holotype off *Proechimys semispinosus,* Cerro Azul (Panamá), 24 January 1956.

Trombicula dasyproctae Ewing

Trombicula dasyproctae Ewing, 1937, Proc. Biol. Soc. Wash., **50**: 172.

In spite of additional examinations of the type host-species from the type locality, this chigger is still known only from the type series, 8 specimens off *Dasyprocta punctata,* Capira (Panamá), 28 August 1931.

Trombicula dicrura Brennan and Jones

Trombicula dicrura Brennan and Jones, 1961, loc. cit., pp. 118–119, fig. 14.

About 125 specimens identified from 32 lots. Hosts: *Coendou rothschildi, Heteromys desmarestianus, Reithrodontomys creper, R. mexicanus, Sciurus granatensis, Peromyscus nudipes, Scotinomys teguina, S. xerampelinus,* and mouse.

Localities: Pedro Miguel River (Canal Zone); Cerro Punta and Boquete Trail (Chiriquí). Taken in the dry season, January to May. For additional Panamanian records, see Brennan and Jones (1961a).

Trombicula dunni Ewing

Trombicula dunni Ewing, 1931, Proc. U. S. Nat. Mus., **80**: 12–13, fig. 2.
Trombicula (*Trombicula*) *agutii* Floch and Fauran, 1957, Arch. Inst. Pasteur Guyane Franç. et Inini, no. 426, pp. 4–6, fig. 2. *New synonymy.*
Trombicula paragoga Brennan and Jones, 1960, Acarologia, 2, (4), pp. 524–527, fig. 18. *New synonymy.*

About 900 specimens identified from 165 lots. Hosts: BIRDS, *Odonto-*

phorus erythrops, Leptotila cassinii, Neomorphus geoffroyi salvini, Microbates cinereiventris; MAMMALS, *Didelphis marsupialis, Marmosa robinsoni, Metachirus nudicaudatus, Philander opossum, Vampyressa pusilla, Dasypus novemcinctus, Bradypus infuscatus, Proechimys semispinosus, Hoplomys gymnurus, Heteromys desmarestianus, H. australis, Dasyprocta punctata, Sciurus granatensis, Microsciurus alfari, Sigmodon hispidus, Oryzomys caliginosus, O. capito, Peromyscus flavidus, P. nudipes, Sylvilagus brasiliensis, Nasua nasua, Felis pardalis, Tayassu tajacu.*

Localities: Barro Colorado Island, Fort Davis, Fort Gulick, Fort Sherman, France Field, Galeta Point, Piña, Paraíso, Summit, Madden Forest, Cacao Plantation, Miraflores, Fort Kobbe, Quarry Heights, and Corte Culebra Road (Canal Zone); Cerro Azul and Cerro Campana (Panamá); Cerro Pirre (Darién); Río Changena, etc. (Bocas del Toro); Camp Pital, etc. (Chiriquí); Cerro Hoya (Los Santos). Active in the dry season. From 1953 to 1963, 95 percent of all collections made were from December to April, the remaining 5 percent sporadically during June, September, October, and November.

T. dunni is a very common polymorphic species parasitizing a wide variety of vertebrates in the American tropics. At least three forms are apparent, but because of intergradation observed in large series and the relative absence of biologic data, any consideration of this taxon other than in terms of population variants is not feasible. Principal differences among the forms are in length, and structure and number of idiosomal setae. Brennan and Jones (1960) redescribed the species, included new synonymy and designated a lectotype.

Trombicula keenani Brennan and Jones

Trombicula keenani Brennan and Jones, 1961, Jour. Parasit., 47, (1), pp. 119–120, fig. 15.

One hundred and thirty-five specimens identified from 38 lots. Hosts: *Didelphis marsupialis, Philander opossum, Heteromys australis, H. desmarestianus, Proechimys semispinosus, Coendou mexicanus, Peromyscus nudipes, Reithrodontomys creper, R. mexicanus, Scotinomys teguina, Oryzomys capito.*

Localities: Piña (Canal Zone); Cerro Pirre (Darién); Boquete Trail, Cerro Punta, Bambito, and El Hato (Chiriquí). From 1954 to 1962, taken principally during the dry season, November to May. In addition, Brennan and Jones (1961a) report *T. keenani* from *Hoplomys gymnurus* and *Sciurus granatensis.*

Trombicula liomys Brennan and Jones

Trombicula liomys Brennan and Jones, 1961, loc. cit., p. 121, fig. 16.

Two specimens off *Liomys adspersus,* Corte Culebra Road (Canal Zone), 28 September 1961. Described from 4 specimens off same host, Curundu (Canal Zone), 8 July 1954 and Corozal (Canal Zone), 21 October 1954. No other records.

Trombicula longicalcar Brennan and Jones

Trombicula longicalcar Brennan and Jones, 1960, Acarologia, 2, (4), pp. 517–518, fig. 13.

Five specimens off *Didelphis marsupialis,* Summit (Canal Zone), 23 January 1962; 17 off (4) *Coendou rothschildi,* along Pedro Miguel River (Canal Zone), 21 February to 20 March 1962; 9 off unidentified bat, Las Palmitas (Los Santos), 27 January 1962; 6 off *Vampyrum spectrum,* Río Changena (Bocas del Toro), 23 September 1961. First records for Panama.

Trombicula manueli Brennan and Jones

Trombicula manueli Brennan and Jones, 1960, loc. cit., pp. 520–522, fig. 15.

Three specimens off *Marmosa robinsoni,* Fort Gulick (Canal Zone), 24 March 1961; 2 off *Didelphis marsupialis,* Piña (Canal Zone), 28 December 1961; 12 off *Sciurus granatensis,* Cerro Punta (Chiriquí), 2 May 1961. First Panamanian records.

The form from the Chiriquí highlands is a variant and may be a subspecies. It differs from the typical form in having a branched palpal ventrotibial seta and more dorsal setae.

Trombicula monops Brennan and Jones

Trombicula monops Brennan and Jones, 1960, loc. cit., pp. 524–525, fig. 17.

One specimen off *Myotis nigricans,* from a cave, Cerro Punta (Chiriquí), 3 May 1961; 3 off undetermined bat, Penonomé (Coclé), 30 January 1962; 1 off *Pteronotus psilotis,* Penonomé, 8 February 1962. First Panamanian records.

Trombicula pecari Brennan and Jones

Trombicula pecari Brennan and Jones, 1960, loc. cit., pp. 527–528, fig. 19.

No additional records since described from 21 specimens off *Tayassu tajacu,* Chiriquí Province, no date, and 1 specimen (not of the type series) off *Bradypus griseus* (= *B. infuscatus*), Chilibre (Panamá), no date.

Trombicula punctata Boshell and Kerr

Trombicula (*s.l.*) *punctata* Boshell and Kerr, 1942, Rev. Acad. Colomb. Cienc. Exacta, Fisico-Quim. y Nat., 5, (17), pp. 15–16 (in reprint), figs. 23, 24.

Twenty-one specimens off *Hoplomys gymnurus,* Piña (Canal Zone), 6 December 1960; 1 off same host, Río Changena (Bocas del Toro), 23 September 1961. First records for Panama.

Fauran (1959) described a very closely related species, *tuberculata,* which in all likelihood is a form of *punctata.* On the basis of a pentagonal scutum with a very sharp posterior angle, a single pair of eyes, and body setae arising from tubercles, he also erected a subgenus, *Boshkerria*—type-species, *Trombicula* (*Boshkerria*) *tuberculata*—to receive these two forms.

Trombicula saccopteryx Brennan and Jones

Trombicula saccopteryx Brennan and Jones, 1960, loc. cit., pp. 530–531, fig. 21.

Ten specimens off *Saccopteryx bilineata*, Pacora (Panamá), 24 April 1957; 27 specimens, same host and locality, 31 October 1960; 13 off same host, Bocas del Toro Province, 24 January 1960; 10 off same host, Cacao Plantation (Canal Zone), 5 February 1962. First Panamanian records.

Trombicula soucouyanti, new species. Figure 30.

DIAGNOSIS: Superficially resembles *T. manueli* Brennan and Jones, a common Caribbean species not known from bats, from which it is separated by a mastitarsala III and branched palpal dorso- and ventrotibial setae.

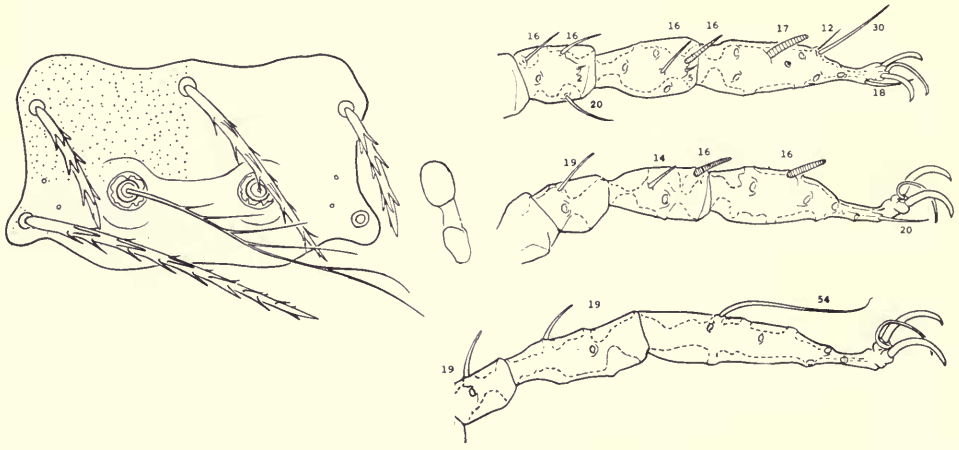

FIG. 30. *Trombicula soucouyanti*, new species. Scutum and eyes. Specialized setae of legs.

DESCRIPTION: *Idiosoma.*—Broad-ovate. Length and width of holotype, engorged, 635 by 450 μ. Eyes 2/2, in an obscure plate, the posterior pair obsolescent. Anus at about fourth row of ventral setae. *Scutum.*—As figured, densely punctate with sinuous margins. Sensillae with several long branches. Measurements of holotype: AW 72, PW 84, SB 30, ASB 33, PSB 19, AP 24, AM 53, AL 33, PL 75, S 73 μ. *Gnathosoma.*—Densely punctate. Cheliceral blades with tricuspid cap. Galeal seta nude. Palpal setae B/B/BNB (laterotibial may be forked); tarsus with seven branched setae, a subterminala, and a tarsala; claw trifurcate. *Legs.*—Densely punctate. Specialized setae as figured. Non-specialized setae with long conspicuous branches. *Body setae.*—Dorsal setae similar to scutals, with semi-appressed branches, 44 to 66 μ, arranged 2-6-6-4-2-2-2. Ventral setae, 2-2 plus 20 to 26.

TYPE MATERIAL: Holotype and 7 paratypes, RML no. 40711, off *Sturnira ludovici*, Cerro Punta (Chiriquí), 24 April 1961, MARU. Holotype in the collection of the Rocky Mountain Laboratory. Paratypes in the Rocky Mountain Laboratory, United States National Museum, British Museum (Natural History), and the Chicago Natural History Museum.

ADDITIONAL MATERIAL: Two specimens from *Myotis* sp., same general locality as type series, 5 May 1961, obviously conspecific, but with posterior area of scutum less densely punctate, anterior angles of scutum less abrupt, and reduced AP (17 μ).

Trombicula tibbettsi Brennan and White

Trombicula tibbettsi Brennan and White, 1960, Jour. Parasit., 46, (3), pp. 348–350, fig. 3.

A single specimen off *Pteronotus suapurensis*, Chilibrillo Caves, Chilibre (Panamá), 2 August 1960. First Panamanian record.

Trombicula tiptoni Brennan and Jones

Trombicula tiptoni Brennan and Jones, 1961, Jour. Parasit., 47, (1), p. 122, fig. 17.

One specimen off *Peromyscus nudipes*, Boquete Trail (Chiriquí), 3 May 1961. Otherwise known only from the holotype, off the same host species from the same general locality, 12 February 1960.

Trombicula vesperuginis Brennan and Jones

Trombicula vesperuginis Brennan and Jones, 1960, Acarologia, 2, (4) pp. 533–535, fig 23.

One specimen off *Carollia perspicillata*, Sardanillo Caves, Summit (Canal Zone), 12 August 1961; 11 off same host, Barro Colorado Island, (Canal Zone), 13 February 1957; 1 off *Glossophaga soricina*, Río Changena (Bocas del Toro), 17 September 1961; 3 off *Vampyrum spectrum*, Río Changena, 23 September 1961; 10 off *G. soricina*, Cerro Hoya (Los Santos), 10 February 1962; 32 off (7) unidentified bats, Los Santos Province, 16 February 1962.

Genus **Vanidicus** Brennan and Jones

Vanidicus Brennan and Jones, 1961, Jour. Parasit., 47, (1), p. 123.

Type-species: *Vanidicus tricosus* Brennan and Jones, 1961.

Vanidicus tricosus Brennan and Jones

Vanidicus tricosus Brennan and Jones, 1961, loc. cit., p. 123, fig. 18.

One specimen off *Heteromys desmarestianus*, Piña (Canal Zone), 7 December 1960. Described from 4 specimens off *Liomys adspersus*, Curundu and Summit Garden (Canal Zone), 8 July and 21 September 1954.

Genus **Vergrandia** Yunker and Jones

Vergrandia Yunker and Jones, 1961, Jour. Parasit., 47, (6), p. 996.

Type-species: *Vergrandia galei* Yunker and Jones, 1961.

Vergrandia galei Yunker and Jones

Vergrandia galei Yunker and Jones, 1961, loc. cit., pp. 997–998, pl. II.

Described from 3 specimens off *Pteronotus parnellii* (= *Chilonycteris rubiginosa*), Chilibrillo Caves, Chilibre (Panamá), 2 August 1960. No additional records.

Abstract

Seventy-six species of chiggers (16 new), distributed among 29 genera (5 new) are recorded. New genera are: *Blix, Crotonasis, Intercutestrix, Myxacarus,* and *Vargatula.* New species and their type hosts are: *Vargatula hispida* off *Dasypus novemcinctus; Euschoengastia belgicae* off *Heteromys desmarestianus; Euschoengastia enhebra* off *Tylomys watsoni; Pseudoschoengastia apista* off *Dasypus novemcinctus; Pseudoschoengastia dasypi* off *Dasypus novemcinctus; Pseudoschoengastia finitima* off *Heteromys*

desmarestianus; Pseudoschoengastia mermeriza off *Coendou rothschildi, Neoschoengastia electron* off *Electron platyrhynchum; Polylopadium confirmatum* off *Oryzomys caliginosus; Blix cabassoi,* intranasal, off *Cabassous centralis; Myxacarus oscillatus,* intranasal, off *Proechimys semispinosus; Alexfainia munozi,* intranasal, off *Pteronotus psilotis; Crotonasis fissa,* intranasal, off *Liomys adspersus; Blankaartia marui* off *Nycticorax nycticorax; Blankaartia wetmorei* off *Nyctanassa violacea; Trombicula soucouyanti* off *Sturnira ludovici.* Keys to the genera and species and a classified host list are given.

Euschoengastia anops Brennan and Jones is synonymized under *Trombicula anophthalma* Hoffmann; *Trombicula agutii* Floch and Fauran and *T. paragoga* Brennan and Jones are synonymized under *T. dunni* Ewing.

New combinations are the transfer of *Trombicula arremonops* Brennan and Jones to *Blankaartia, Euschoengastia precaria* Brennan and Dalmat to *Perissopalla,* and *Euschoengastia tryssa* Brennan and Jones to *Intercutestrix.*

The description of the genus *Polylopadium* Brennan and Jones has been expanded and additional descriptions and/or illustrations are given for *Polylopadium kramisi* Brennan and Jones and *Perissopalla precaria* (Brennan and Dalmat).

HOST-PARASITE LIST

Class Reptilia

Order Squamata

Suborder Iguanidae

Ameiva bifrontata
Eutrombicula alfreddugesi (Oudemans)
" *goeldii* (Oudemans)

Ameiva festiva
Eutrombicula goeldii (Oudemans)

Ameiva undulata
Eutrombicula alfreddugesi (Oudemans)
" *goeldii* (Oudemans)

Anolis sp.
Eutrombicula alfreddugesi (Oudemans)

Sceloporus sp.
Eutrombicula alfreddugesi (Oudemans)
Pseudoschoengastia bulbifera Brennan

Spilotes pullatus
Eutrombicula alfreddugesi (Oudemans)

lizards
Eutrombicula alfreddugesi (Oudemans)

Suborder Serpentes

Oxybelis sp.
Eutrombicula alfreddugesi (Oudemans)

Pseustes poecilonotus
Eutrombicula alfreddugesi (Oudemans)
" *goeldii* (Oudemans)

Class Aves

Order Pelecaniformes

Anhinga anhinga
Blankaartia sinnamaryi (Floch and Fauran)

Order Ciconiiformes

Nyctanassa violacea
Blankaartia wetmorei n. sp.

Nycticorax nycticorax
Blankaartia marui n. sp.

Order Falconiformes

Caracara plancus
Eutrombicula batatas (Linnaeus)

Hypomorphnus urubitinga
Eutrombicula batatas (Linnaeus)

Order Galliformes

Gallus gallus
Eutrombicula batatas (Linnaeus)

Odontophorus erythrops
Eutrombicula alfreddugesi (Oudemans)
Odontacarus fieldi Brennan and Jones
Trombicula dunni Ewing

Order Gruiformes

Aramides cajanea
Blankaartia sinnamaryi (Floch and Fauran)

Order COLUMBIFORMES

Leptotila cassinii
Trombicula dunni Ewing

Order CUCULIFORMES

Crotophaga ani
Eutrombicula batatas (Linnaeus)
Neomorphus geoffroyi salvini
Eutrombicula goeldii (Oudemans)
Odontacarus fieldi B. & J.
Trombicula dunni Ewing

Order STRIGIFORMES

Ciccaba virgata
Blankaartia sinnamaryi (Floch and Fauran)
Otus guatemalae
Blankaartia sinnamaryi (Floch and Fauran)

Order CAPRIMULGIFORMES

Caprimulgus rufus
Blankaartia sinnamaryi (Floch and Fauran)
Nyctidromus albicollis
Eutrombicula batatas (Linnaeus)
Blankaartia sinnamaryi (Floch and Fauran)

Order TROGONIFORMES

Trogon massena
Blankaartia sinnamaryi (Floch and Fauran)

Order CORACIIFORMES

Electron platyrhynchum
Neoschoengastia electron n. sp.
Baryphthengus ruficapillus
Blankaartia sinnamaryi (Floch and Fauran)
Momotus momota
Eutrombicula goeldii (Oudemans)

Order PICIFORMES

Bucconidae, undet. sp.
Blankaartia sinnamaryi (Floch and Fauran)
Malacoptila panamensis
Eutrombicula goeldii (Oudemans)
Monasa morphoeus
Blankaartia sinnamaryi (Floch and Fauran)

Order PASSERIFORMES

Dendrocincla homochroa
Blankaartia sinnamaryi (Floch and Fauran)
Xiphorhynchus guttatus
Blankaartia sinnamaryi (Floch and Fauran)
Sclerurus guatemalensis
Blankaartia sinnamaryi (Floch and Fauran)
Taraba major
Eutrombicula alfreddugesi (Oudemans)
Blankaartia sinnamaryi (Floch and Fauran)
Dysithamnus mentalis
Blankaartia sinnamaryi (Floch and Fauran)
Myiozetetes sp.
Eutrombicula batatas (Linnaeus)
Blankaartia sinnamaryi (Floch and Fauran)
Myiarchus ferox
Blankaartia sinnamaryi (Floch and Fauran)
Cyphorhinus aradus phaeocephalus
Eutrombicula goeldii (Oudemans)
Dumetella carolinensis
Blankaartia sinnamaryi (Floch and Fauran)
Hylocichla ustulata
Blankaartia sinnamaryi (Floch and Fauran)
Catharus mexicanus
Eutrombicula batatas (Linnaeus)
Blankaartia sinnamaryi (Floch and Fauran)
Microbates cinereiventris
Trombicula dunni Ewing
Blankaartia sinnamaryi (Floch and Fauran)
Oporornis formosus
Blankaartia sinnamaryi (Floch and Fauran)
Geothlypis semiflava
Blankaartia sinnamaryi (Floch and Fauran)
Icterus mesomelas
Blankaartia sinnamaryi (Floch and Fauran)
Piranga rubra
Blankaartia sinnamaryi (Floch and Fauran)
Sporophila aurita corvina
Blankaartia sinnamaryi (Floch and Fauran)
Arremonops conirostris
Blankaartia arremonops (B. & J.)

Class Mammalia

Order Marsupialia
Family Didelphidae

Marmosa mexicana
Eutrombicula goeldii (Oudemans)
Pseudoschoengastia bulbifera Brennan

Marmosa robinsoni
Eutrombicula alfreddugesi (Oudemans)
" *goeldii* (Oudemans)
Leptotrombidium panamensis (Ewing)
Pseudoschoengastia bulbifera Brennan
Trombicula dunni Ewing
" *manueli* B. & J.

Philander opossum
Crotiscus desdentatus (Boshell and Kerr)
Euschoengastia nunezi (Hoffmann)
Eutrombicula alfreddugesi (Oudemans)
" *goeldii* (Oudemans)
Pseudoschoengastia bulbifera Brennan
Trombicula dunni Ewing
" *keenani* B. & J.

Metachirus nudicaudatus
Eutrombicula goeldii (Oudemans)
Myxacarus oscillatus n. sp.
Trombicula dunni Ewing

Didelphis marsupialis
Ascoschoengastia dyscrita B. & J.
Crotiscus desdentatus (Boshell and Kerr)
Euschoengastia megastyrax B. & J.
" *nunezi* (Hoffmann)
" *tragulata* B. & J.
Eutrombicula alfreddugesi (Oudemans)
" *goeldii* (Oudemans)
Hoffmannina handleyi B. & J.
Leptotrombidium panamensis (Ewing)
Odontacarus fieldi B. & J.
Pseudoschoengastia bulbifera Brennan
Sasacarus furmani (Hoffmann)
Trombicula dunni Ewing
" *keenani* B. & J.
" *longicalcar* B. & J.
" *manueli* B. & J.

Chironectes minimus
Doloisia (*Kymocta*) *chironectes* Yunker and Brennan

Order Insectivora
Family Soricidae

Cryptotis sp.
Pseudoschoengastia bulbifera Brennan

Order Chiroptera
Family Emballonuridae

Saccopteryx bilineata
Beamerella acutascuta Brennan
Euschoengastia desmodus Brennan and Dalmat
Trombicula saccopteryx B. & J.

Peropteryx macrotis
Tecomatlana sandovali Hoffmann

Family Phyllostomidae

Pteronotus parnellii
Alexfainia chilonycteris Yunker and Jones
Trombicula anophthalma Hoffmann
Vergrandia galei Yunker and Jones

Pteronotus psilotis
Alexfainia munozi n. sp.
Perates insessus Brennan and Dalmat
Trombicula monops B. & J.

Pteronotus suapurensis
Trombicula tibbettsi Brennan and White

Micronycteris megalotis
Beamerella acutascuta Brennan
Euschoengastia desmodus Brennan and Dalmat
Perissopalla precaria (Brennan and Dalmat)

Phyllostomus hastatus
Blankaartia sinnamaryi (Floch and Fauran)
Trombicula carmenae B. & J.

Vampyrum spectrum
Trombicula longicalcar B. & J.
" *vesperuginis* B. & J.

Glossophaga soricina
Euschoengastia desmodus Brennan and Dalmat
Trombicula vesperuginis B. & J.

Carollia castanea
Euschoengastia desmodus Brennan and Dalmat

Carollia perspicillata
Alexfainia chilonycteris Yunker and Jones
Beamerella acutascuta Brennan
Euschoengastia megastyrax B. & J.
Trombicula vesperuginis B. & J.

Carollia subrufa
Euschoengastia colombiae (Boshell and Kerr)

Euschoengastia desmodus Brennan and Dalmat

Sturnira ludovici
Pseudoschoengastia bulbifera Brennan
Trombicula carmenae B. & J.
" *soucouyanti* n. sp.

Vampyressa pusilla
Trombicula dunni Ewing

Artibeus toltecus
Leptotrombidium panamensis (Ewing)

Artibeus jamaicensis
Trombicula carmenae B. & J.

Family Vespertilionidae

Myotis nigricans
Trombicula monops B. & J.

Myotis sp.
Trombicula soucouyanti n. sp.

Family unknown

Alexfainia munozi n. sp.
Euschoengastia desmodus Brennan and Dalmat
Euschoengastia megastyrax B. & J.
Eutrombicula goeldii (Oudemans)
Tecomatlana sandovali Hoffmann
Trombicula longicalcar B. & J.
" *monops* B. & J.
" *vesperuginis* B. & J.

Order PRIMATES
Family Cebidae

Aotus trivirgatus
Eutrombicula alfreddugesi (Oudemans)
" *goeldii* (Oudemans)

Family Callithricidae

Saguinus geoffroyi
Eutrombicula alfreddugesi (Oudemans)
" *goeldii* (Oudemans)
Pseudoschoengastia bulbifera Brennan

Family Hominidae

Homo sapiens
Eutrombicula batatas (Linnaeus)

Order EDENTATA
Family Bradypodidae

Bradypus infuscatus
Trombicula pecari B. & J.
" *dunni* Ewing

Family Dasypodidae

Cabassous centralis
Blix cabassoi n. sp.

Dasypus novemcinctus
Aniatrus bifax B. & J.
Eutrombicula goeldii (Oudemans)
Myxacarus oscillatus n. sp.
Pseudoschoengastia apista n. sp.
" *dasypi* n. sp.
Trombicula dunni Ewing
Vargatula hispida n. sp.

Order LAGOMORPHA
Family Leporidae

Sylvilagus brasiliensis
Eutrombicula alfreddugesi (Oudemans)
" *goeldii* (Oudemans)
Trombicula dunni Ewing

Order RODENTIA
Family Sciuridae

Sciurus granatensis
Eutrombicula alfreddugesi (Oudemans)
" *goeldii* (Oudemans)
Odontacarus fieldi B. & J.
Trombicula dicrura B. & J.
" *dunni* Ewing
" *keenani* B. & J.
" *manueli* B. & J.

Microsciurus alfari
Eutrombicula goeldii (Oudemans)
Trombicula dunni Ewing

Family Heteromyidae

Liomys adspersus
Ascoschoengastia dyscrita B. & J.
Crotonasis fissa n. sp.
Eutrombicula goeldii (Oudemans)
Leptotrombidium panamensis (Ewing)
Odontacarus fieldi B. & J.
Polylopadium kramisi B. & J.
Pseudoschoengastia bulbifera Brennan
" *zona* Brennan
Trombicula liomys B. & J.
Vanidicus tricosus B. & J.

Heteromys australis
Eutrombicula goeldii (Oudemans)
Leptotrombidium panamensis (Ewing)
Pseudoschoengastia bulbifera Brennan
" *zona* Brennan
Trombicula dunni Ewing
" *keenani* B. & J.

Heteromys desmarestianus
Ascoschoengastia dyscrita B. & J.
Crotiscus desdentatus (Boshell and Kerr)
Euschoengastia belgicae n. sp.
Eutrombicula alfreddugesi (Oudemans)
" *goeldii* (Oudemans)
Hoffmannina handleyi B. & J.

Doloisia (Kymocta) teratarsalis Yunker and Brennan
Pseudoschoengastia bulbifera Brennan
" *finitima* n. sp.
Sasacarus furmani (Hoffmann)
Trombicula dicrura B. & J.
" *dunni* Ewing
" *keenani* B. & J.
Vanidicus tricosus B. & J.

Family Cricetidae

Oryzomys albigularis
Pseudoschoengastia bulbifera Brennan

Oryzomys alfaroi
Eutrombicula alfreddugesi (Oudemans)
Pseudoschoengastia bulbifera Brennan

Oryzomys bombycinus
Leptotrombidium panamensis (Ewing)
Pseudoschoengastia bulbifera Brennan

Oryzomys caliginosus
Ascoschoengastia dyscrita B. & J.
Eutrombicula goeldii (Oudemans)
Intercutestrix tryssa (B. & J.)
Leptotrombidium panamensis (Ewing)
Polylopadium confirmatum n. sp.
Pseudoschoengastia bulbifera Brennan
" *zona* Brennan
Trombicula dunni Ewing

Oryzomys capito
Ascoschoengastia dyscrita B. & J.
Euschoengastia cunctata B. & J.
Eutrombicula alfreddugesi (Oudemans)
" *goeldii* (Oudemans)
Intercutestrix tryssa (B. & J.)
Myxacarus oscillatus n. sp.
Pseudoschoengastia abditiva Brennan
" *bulbifera* Brennan
Trombicula dunni Ewing
" *keenani* B. & J.
Leptotrombidium panamensis (Ewing)

Oryzomys fulvescens
Trombicula caccabulus B. & J.

Oryzomys sp.
Eutrombicula alfreddugesi (Oudemans)
Pseudoschoengastia bulbifera Brennan

Nectomys alfari
Crotiscus desdentatus (Boshell and Kerr)
Eutrombicula goeldii (Oudemans)
Pseudoschoengastia bulbifera Brennan

Tylomys watsoni
Ascoschoengastia dyscrita B. & J.
Euschoengastia enhebra n. sp.
Intercutestrix tryssa (B. & J.)
Kymocta teratarsalis Yunker and Brennan
Pseudoschoengastia zona Brennan
Sasacarus furmani (Hoffmann)

Reithrodontomys creper
Hoffmannina suriana (Hoffmann)
Trombicula dicrura B. & J.
" *keenani* B. & J.

Reithrodontomys mexicanus
Eutrombicula alfreddugesi (Oudemans)
Hoffmannina handleyi B. & J.
Trombicula caccabulus B. & J.
" *dicrura* B. & J.
" *keenani* B. & J.

Reithrodontomys sumichrasti
Hoffmannina suriana (Hoffmann)

Reithrodontomys sp.
Eutrombicula batatas (Linnaeus)
Hoffmannina handleyi B. & J.
Pseudoschoengastia bulbifera Brennan
Trombicula chiriquensis B. & J.

Peromyscus flavidus
Eutrombicula alfreddugesi (Oudemans)
Trombicula dunni Ewing

Peromyscus nudipes
Cordiseta mexicana (Hoffmann)
Euschoengastia libertatis Brennan and Dalmat
" *spissa* B. & J.
Eutrombicula alfreddugesi (Oudemans)
Hoffmannina handleyi B. & J.
" *suriana* (Hoffman)
Pseudoschoengastia bulbifera Brennan
Trombicula caccabulus B. & J.
" *dicrura* B. & J.
" *dunni* Ewing
" *keenani* B. & J.
" *tiptoni* B. & J.

Peromyscus sp.
Polylopadium kramisi B. & J.
Pseudoschoengastia bulbifera Brennan
Trombicula chiriquensis B. & J.

Zygodontomys microtinus
Eutrombicula alfreddugesi (Oudemans)
" *batatas* (Linnaeus)
" *goeldii* (Oudemans)
Leptotrombidium panamensis (Ewing)
Odontacarus fieldi B. & J.
Pseudoschoengastia bulbifera Brennan

Scotinomys teguina
Cordiseta mexicana (Hoffmann)
Eutrombicula alfreddugesi (Oudemans)
Hoffmannina handleyi B. & J.
Trombicula caccabulus B. & J.
" *chiriquensis* B. & J.
" *dicrura* B. & J.
" *keenani* B. & J.

Scotinomys xerampelinus
Eutrombicula alfreddugesi (Oudemans)
Hoffmannina suriana (Hoffmann)
Pseudoschoengastia bulbifera Brennan
Trombicula dicrura B. & J.

Sigmodon hispidus
Ascoschoengastia dyscrita B. & J.
Crotiscus desdentatus (Boshell and Kerr)
Eutrombicula alfreddugesi (Oudemans)
" *batatas* (Linnaeus)
" *goeldii* (Oudemans)
Intercutestrix tryssa (B. & J.)
Leptotrombidium panamensis (Ewing)
Odontacarus fieldi B. & J.
Pseudoschoengastia bulbifera Brennan
" *zona* Brennan
Trombicula dunni Ewing

Family Muridae

Rattus rattus
Eutrombicula goeldii (Oudemans)

Family Erethizontidae

Coendou mexicanus
Trombicula keenani B. & J.

Coendou rothschildi
Euschoengastia tragulata B. & J.
Eutrombicula alfreddugesi (Oudemans)
" *goeldii* (Oudemans)
Leptotrombidium panamensis (Ewing)
Pseudoschoengastia mermeriza n. sp.
Speleocola secunda B. & J.
Trombicula dicrura B. & J.
" *longicalcar* B. & J.

Family Hydrochaeridae

Hydrochaeris hydrochaeris
Blankaartia alleei (Ewing)
Eutrombicula alfreddugesi (Oudemans)
" *batatas* (Linnaeus)

Family Dasyproctidae

Agouti paca
Eutrombicula alfreddugesi (Oudemans)

Dasyprocta punctata
Eutrombicula goeldii (Oudemans)
Trombicula dasyproctae Ewing
" *dunni* Ewing

Proechimys semispinosus
Ascoschoengastia dyscrita B. & J.
Crotiscus desdentatus (Boshell and Kerr)
Eutrombicula alfreddugesi (Oudemans)
" *goeldii* (Oudemans)
Intercutestrix tryssa (B. & J.)
Leptotrombidium panamensis (Ewing)
Myxacarus oscillatus n. sp.
Odontacarus chiapanensis (Hoffmann)
" *fieldi* B. & J.
Polylopadium kramisi B. & J.
Pseudoschoengastia bulbifera Brennan
Sasacarus furmani (Hoffmann)
Trombicula cribanus B. & J.
" *dunni* Ewing
" *keenani* B. & J.

Hoplomys gymnurus
Ascoschoengastia dyscrita B. & J.
Crotiscus desdentatus (Boshell and Kerr)
Eutrombicula goeldii (Oudemans)
Doloisia (Kymocta) teratarsalis Yunker and Brennan
Leptotrombidium panamensis (Ewing)
Myxacarus oscillatus n. sp.
Pseudoschoengastia bulbifera Brennan
Trombicula dunni Ewing
" *keenani* B. & J.
" *punctata* Boshell and Kerr

mouse
Eutrombicula alfreddugesi (Oudemans)
Hoffmannina handleyi B. & J.
Trombicula dicrura B. & J.

Order CARNIVORA
Family Procyonidae

Nasua nasua
Euschoengastia tragulata B. & J.
Eutrombicula alfreddugesi (Oudemans)
" *goeldii* (Oudemans)
Trombicula dunni Ewing

Family Felidae

Felis pardalis
Eutrombicula goeldii (Oudemans)
Odontacarus fieldi B. & J.
Trombicula dunni Ewing

Order ARTIODACTYLA
Family Tayassuidae

Tayassu tajacu
Eutrombicula alfreddugesi (Oudemans)
Trombicula dunni Ewing
" *pecari* B. & J.

Family Cervidae

Mazama americana
Eutrombicula batatas (Linnaeus)

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